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ABSTRACT

This activity packet for grade 5 is one of a series developed in response to concern for energy conservation. It contains activities that stress an energy conservation ethic and includes many values clarification activities for grade five. The packet is divided into two parts and provides the teacher with background information, concepts and objectives, and activities for each part. Part one is concerned with fossil fuels and part two with the history of energy in Iowa. Two annotated bibliographies, one for teachers and the other for students, are also included. The teacher is provided with ditto and transparency master pages to use in the classroom. An evaluation sheet and a listing of resources are also a part of this activity packet. (MA)

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ENERGY

Conservation Activity Packet

Grade 5

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NOTE TO SCHOOLS AND TEACHERS

The filmstrips referred to in the 5th and 6th grade sets can be borrowed from your local AEA. The AEA's have five (5) sets of the filmstrips available. You may wish to make arrangements with them for purchasing a copy of these filmstrips for your own building. The cost was prohibitive for us to include the filmstrips in each packet.

Thank you for your understanding.

ENERGY CONSERVATION ACTIVITY PACKETS

Ruth Bakke
project writer/coordinator

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Northwest School
Ankeny
- Steve Rue
- Ruth Bond
- Lucretia Smith

Southeast School
Ankeny
- Marge Ranney

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INTRODUCTION TO ENERGY PACKETS

The energy shortages and emergencies with which we are faced attest the treatment humans have given to their natural surroundings. Not only do we experience personal inconveniences but we also see severe economic and environmental consequences. Our nation has arrived at a time when it needs to reevaluate where it is going, at what speed, and how it will eventually arrive at that goal. The National Academy of Sciences generally agrees that the reserves and resources of domestic oil, gas and coal will satisfy energy needs in the United States until the year 2000. Presently the United States doubles its energy consumption every 13 years. In 1975, electric companies burned 507 million barrels of oil to generate electricity, 500 million barrels were burned to heat factories. Much of the oil and natural gas consumed could be replaced by coal, thus drastically reducing oil imports.

The instructional program in a school can examine this energy situation with reason and logic. When a social issue is integrated into the total curriculum, it helps children to apply what they are learning. The educational process can help students become aware of the alternatives and consequences in regard to energy, then guide them to choose a value. Students can learn that it is just as exciting to make something last as it is to develop something new.

Through use of the enclosed materials and activities, it is our intent to stress a conservation ethic. The conservation ethic means more than turning lights off, it has wider implications such as developing new industries to recycle metals, making more durable products, and prioritizing fuel uses.

Our values show what we tend to do with our limited time and energy. They are related to the experiences that shape them. In order to help children develop clearer values, teachers must help them use the process of valuing. Students become much more purposeful when they have been given opportunities to clarify their values.

Each packet contains values clarification exercises designed to carry out the stated objectives. The teacher may wish to use a specific model to develop more exercises. You will find that the valuing process is another tool for the teacher. When used, it leads children from apathy and confusion toward positive learning and life-styles.

The goal of providing the types of activities, which have been included, is to create a growing awareness for the need of dealing with existing energy problems in a positive way. Individual teachers should select objectives which they feel reflect the needs of a particular class. Each packet contains an energy concept and an awareness or accommodation concept. It is imperative to include objectives from each conceptual area as the purpose of these packets is to develop an energy conservation ethic within the students of today that they

may become conserving and concerned citizens of tomorrow. Changes may not occur immediately due to home and parental values; however, as they become adults, this learning will show its effects.

Each packet includes many activities for the teaching towards the stated objectives. Teachers need choose only those activities which they feel will accomplish their objectives. The teaching of energy and its conservation is designed to be interdisciplinary in order that students see that energy cannot be isolated from our daily lives. This is also important in developing the conservation ethic.

Within the packet, teachers will find transparencies, posters, filmstrips, etc. which may add to the teaching of energy and development of conservation. Suggestions and criticisms from teachers, consultants, etc. would be appreciated and considered in keeping these packets suitable for the majority of school systems.

Most young children in the primary grades are within the concrete operational stage, as named by Piaget. They do not have the ability to separate the abstract from something. Therefore, the activities which have been proposed reflect this and provide for greater awareness, rather than a formal study of energy. Individual teachers know their students best and will need to select items which they feel will be of greatest benefit to the education of the children. This is also the reason the concepts and objectives for the primary grades (K-2) have been combined in one packet. There are some classroom activities which require about 20 minutes each, some 40 minutes, and there are also some activities which can be done at home in order to enable children to work with their families.

ENERGY CONSERVATION ACTIVITY PACKETS

GRADE 5

PACKET "A"

TEACHER BACKGROUND MATERIAL
Grade 5 - Packet "A"

Fossil fuels--coal, oil, and natural gas--resulted over a very long period of time when plants died, decayed, water flowed over them, and pressure along with heat and bacteria changed the plants. It has been estimated that the average American each day uses the following energy sources:

13.6 pounds of coal
3.3 gallons of oil
297 cubic feet of natural gas
3.7 kilowatt hours of hydroelectric power
.7 kilowatt hours of nuclear power

In a lifetime, an American consumes 170 tons of coal, 2,000 barrels of oil, and 7.5 million cubic feet of natural gas. In the year 1900 Americans used 25% of the amount of energy we use today. In the year 2000 people will use twice as much as they use today at the present rate of growth.

Petroleum is found in porous rock beneath the earth's surface. Drilling for oil requires a great amount of human and machine energy. The U.S. presently does not produce enough oil for its energy needs and one-third of the oil it uses is imported from foreign sources. Oil is not only used for space heating and gasoline for cars, etc., but it is also used as a raw material in fabrics, plastics, medicines, fertilizers, etc. Of the known world oil reserves, the Middle East has nearly two-thirds and the U.S. less than 9%. Petroleum comes from the Greek word meaning "rock oil." Pitch, a form of petroleum, has been used since ancient times as a mortar, grease, etc.

Natural gas is the cleanest burning of the fossil fuels and the most convenient to produce and use. It is also the least damaging to the environment. Natural gas, too, is trapped in layers of rock, often found with oil deposits. The methods of recovering natural gas are expensive and sometimes more energy is expended to recover the gas than the energy produced. It is used by industrial and commercial concerns and is used directly by 44 million homes for heating, cooking, and cooling.

Coal is the most abundant fossil fuel in the U.S. Coal is mined by either one of two methods--stripmining or underground. Cost of land reclamation is now a portion of the overall cost of coal production. Coal must be combusted to release its stored chemical energy. The release of sulfur dioxide during combustion can create an enormous health hazard. Underground mining is dangerous and presents other health hazards. Surface mining disrupts the soil structure and changes the natural contours of the land.

Many of the activities in the 5th grade packets require between 20 and 40 minutes depending upon the length of discussion. Some of the activities require research and/or group work and are long-range in nature. There are also activities which are designed to be done at home and follow-up provided in the classroom.

CONCEPTS AND OBJECTIVES IN ENERGY CONSERVATION

Grade 5 - Packet "A"

Energy

1.00 The learner develops an understanding of fossil fuels and uses.

1.1 Recognizes how a fossil fuel is formed.

1.11 Discovers how sun, air, water, organic material play roles in the formation of fossil fuels.

1.2 Realizes that the formation of fossil fuels is slow.

1.3 Understands the burning qualities of fuels.

1.4 Becomes aware of how fossil fuels are utilized.

1.5 Begins to realize that fossil fuels are non-renewable.

1.6 Develops an energy flow concept.

Personal Accommodation

2.00 The learner will develop a conservation ethic in regard to energy.

2.1 Acquires experience in making decisions and accepting the consequences of the decisions.

2.2 Expresses personal value that is received from energy conservation.

2.3 Chooses activities which will utilize energy conservation in making contributions to the school and community.

2.4 Investigates methods concerned citizens use to improve the future of energy solutions.

2.5 Develops an idea of type of life-style desired in consideration of the amount of energy required.

2.6 Explores the implications of a life-style in their home and community that results from an energy conservation ethic.

ENERGY ACTIVITIES
Grade 5 - Packet "A"

1.00 The learner develops an understanding of fossil fuels and uses.

How Fossil Fuels Are Formed

1.1 Obtain samples of oil and coal and examine them with the class. Observe the characteristics of the samples and record these.

1.1 Prepare a hypothetical time line showing the formation of coal.

1.1, 1.2, 1.4 Write a letter to a major oil company asking if they have any materials which depict the natural processes by which their energy source was formed.

1.1, 1.2 Take a field trip to a coal mine to find out more about what coal is and how it is taken from the ground. This would be an excellent activity to precede the next two activities. If a field trip is not feasible, use filmstrip of coal mining. (*Filmstrip #1 - Part A*)

1.1, 1.2 Create a fossil fuel display. Exhibit labeled samples, and include booklets, reports, etc. resulting from research and careful planning.

1.1, 1.2 Construct a chart showing the formation of fossil fuels (coal, oil, gas) from the original plant or animal life to discovery by man.

1.1, 1.2, 1.3 The class prepares a bulletin board using graphs, pictures, charts, and maps about fossil fuel types, fossil fuel use, fossil fuel pollution, fossil fuel reserves.

1.1, 1.2 Credit: Living Within Our Means: Energy and Scarcity, Environmental Education Instructional Activities, K-6, The University of the State of New York, The State Education Department.

Play a variation of "Hangman." On the chalkboard, instead of writing the first and last letters of a word, make drawings like the ones below:

Ask the students to suggest the drawings that should be in the spaces between the sun and the automobile. As children suggest correct responses, have them make the drawing in the space. Incorrect responses are used to build the "Hangman." (Correct responses are sun, plant, protozoans, sedimentary rocks containing oil, oil, and automobile.) Discussion should lead to the understanding that the energy to drive a car came from the sun via green plants.

Have children do research to find out how fossil fuels were formed long ago. Place a drop of oil on a piece of igneous rock (granite), a sedimentary rock (sandstone or limestone), and a metamorphic rock (gneiss or marble). Which absorbs and stores the oil? (The sedimentary rock because it is porous.)

a. Why is oil called a fossil fuel?

b. What are other fossil fuels? How was coal formed? How was natural gas formed?

c. Are fossil fuels still being formed? If so, why are we concerned about the depletion of fossil fuels?

1.1, 1.6 Contact your local gas company to find out where your community's gas supply comes from and what happens to it before it reaches you. Using diagrams, make a bulletin board display to show this flow of natural gas. The class could add scenery and cutouts of their own homes, schools, stores, and industries.

Cutouts and a booklet can be obtained free of charge from American Gas Association, Education Services, 1515 Wilson Boulevard, Arlington, Virginia 22209. Ask for "Natural Gas Serves Our Community Kit"--N00160 and "Flames and Energy"--NS1070.

Burning Qualities of Fuels

1.3 Credit: Energy Activities for the Classroom--1976, Herbert L. Coon and Michele Y. Alexander, ERIC Center for Science, Mathematics, and Environmental Education, Ohio State University, 1200 Chambers Road, Columbus, Ohio 43212.

Make arrangements with a science teacher to have him or one of his students work with your class to examine the burning qualities of several different substances. While the testing can be done in any classroom, the ideal arrangement would be to take the class to a high school laboratory for the experiments. Plan to burn several substances such as (1) candle, (2) wooden splint, (3) sliver of very soft coal, (4) kerosene (lamp), (5) alcohol (lamp), and (6) natural gas in a Bunsen burner (if possible). As each substance is burned they should respond to the questions on *Data Sheet #1*.

If the Bunsen burner is available, the superiority of natural gas over the other substances will be easily apparent. Without the burner, the exercise will illustrate some of the problems of using coal as a fuel. Discuss results.

1.3 Have groups of students contact utilities and industries to find out what fuels they burn, why, and whether they need to add equipment to meet air quality standards.

1.3 Have a group of students read "The Best Present of All," a reprint from Ranger Rick, and then either present it as a play or as a puppet show to the rest of the class. It explains about the fossil fuels in a most entertaining way. A single free copy of the reprint can be obtained from National Wildlife Federation, 1412 Sixteenth Street, N.W., Washington, D.C. 20036.

How Fossil Fuels Are Utilized

1.4 Credit: Energy for Today and Tomorrow, San Diego City/County Schools Energy Education Committee, Department of Education, San Diego County, 6401 Linda Vista Road, San Diego, California 92111, 1975.

As a reading exercise, or at an interest center, provide copies of *Master #1, 2*. The students learn more about petroleum and natural gas through means of a story where they fill in blanks, and through the use of a crossword puzzle.

1.4 Research the types of uses of each fossil fuel--to see that it is important to conserve them for more than heating purposes. Students could incorporate their findings into a bulletin board display.

1.4 Students could prepare dioramas of how fossil fuels are used. Short reports could be attached to the diorama displays.

1.4 Display items such as styrofoam, piece of plastic, plastic record, lipstick, candle, vaseline, etc. as an interest center. Include stimulation for students to research to find out why these are included in a study of fossil fuels. See Student Interest Center #1 for suggestions for student action cards.

Fossil Fuels Are Non-Renewable

1.5 An object lesson will help the students gain a better understanding of the idea of non-renewable. The teacher brings a half dozen balls, jumping ropes, boxes of crayons, or other object and asks the students to count them. Two students come forward to take objects, then three more are invited to take objects. The students are then asked what is happening to the supply and are reminded there are no more. When one item is remaining the rest of the class is invited to come forward to get objects.

a. Why can't everyone have an object?

b. Lead the discussion into the idea of "non-renewable."

1.5 Debate the pros and cons of using fossil fuels. This could also be a panel discussion including students, parents, utility representative, etc.

1.5 Divide the class into four groups of detectives and assign each group an area of the classroom. Each group of detectives is responsible for compiling a list of the different objects in their area and find information about the natural resources used to make each object. Resources for research would include books, encyclopaedias, and the school custodian. Use *Data Sheet #2* for gathering information.

a. Which of the resources on your list are renewable?

b. Are any of these becoming scarce? Is the government or industry doing anything to improve the situation?

1.5 Divide the class into groups to research oil and natural gas. Then bring the groups together for a discussion. Guide the discussions to what it would be like if we did not have oil and natural gas, or if we had very little coal. These ideas could be summarized in chart stories or reports.

Energy Flow

1.6 Use *Transparency #1*. Discuss that energy is neither created nor destroyed--it is converted from one form to another and as it is used each time, it experiences some loss so you never have the same amount as when you started.

1.6 Use a map of your community. Have the students trace the flow of energy in and out of the community. Invite resource people into the classroom to explain this flow of energy in and out.

1.6 Students could choose an activity (or machine, industry, product, etc.) and trace the flow of energy. These could be displayed pictorally or in simple line drawings.

Example: sun-corn-pig-farmer-packing plant-store-meat

Then discuss whether some of the steps could be eliminated, if that would save energy, and what efforts they will make to reduce these steps in their own families.

2.00 Personal Accommodation: Conservation Ethic

Making Decisions, Accepting Consequences

2.1, 2.2, 2.5 Values Continuum--Values Clarification Activity

The teacher identifies an issue (see suggestion or make up your own) and draws a long line on the board. Then place the two polar positions and mark a series of points along the continuum. Say, "Between the end points there are many positions. I am going to whip around the room and ask you to tell me where you stand on this issue. Briefly describe your position without giving reasons. Later you can share your reasons. You may pass if you wish."

If clustering occurs, you may wish to have the students write their answers on a piece of paper and the teacher randomly selects a few to be placed on the board. A discussion takes place on each presented issue.

Suggestions

1. What do you know about fossil fuels?

FUELS FOREVER	::::::::::::::::::::::::	MORE FUELS NEVER

2. Where does Iowa get its energy?

IMA INDEPENDENT (no outside sources of energy needed)	::::::::::::::::::::	DOLLY DEPENDENT (depends on outside sources of energy)

3. How should we use our energy?

FUELISH FRED (use, use, use)	::::::::::::::::::::::::	CAVEMAN CAL (don't use any)

4. Who solves the problem of an energy shortage?

CALCULATING CONGRESS	::::::::::::::::::::	EVERETT EVERYBODY

2.1, 2.2,
2.5 Values Focus Game--Values Clarification Activity

First of all the students are to write completions to several stem sentences. After the students have completed the unfinished sentences, they are arranged in groups of three. Each student in the group is to have full attention (focus) of the other two members of the group for five minutes. During this period he is to talk about his responses. All action is to be governed by three rules. The teacher provides each student with a copy of the rules (*Master #3*).

Suggestions for Stem Sentences

1. I feel people use fossil fuels...
2. I feel we should use...for heating our homes.
3. A more efficient way to use our electricity is...

2.1, 2.2,
2.5 Strongly Agree/Strongly Disagree--Values Clarification Activity

With this activity the student is not allowed to take a neutral stand. The teacher provides the students with a work sheet containing a series of belief statements (*Master #4*). The students complete the work sheet individually then the teacher breaks up the class into groups of three to share and discuss their responses. The Values Focus Rules (*Master #3*) may be used for the discussion. Indicate that there is no correct way to answer these statements.

2.2, 2.2,
2.5 Removing Barriers to Action--Values Clarification Activity

This particular activity is designed to help students identify and remove barriers to action. The teacher asks students to write at the top of a paper some action regarding energy they would like to take or decision they would like to make. This should be an action which they are having some difficulty taking. Then they should draw a line lengthwise down the middle of the paper. On the left-hand side of the paper they are to list all the imagined or real barriers which seem to be keeping them from acting (these can be from inside and outside themselves). On the right-hand side they should list steps they could take which might help remove or reduce the barriers. Once this has been done they should use the back side and develop a plan of action for actually removing the barriers. This activity can be done individually or in small groups.

Example

Recycling cans, glass, and paper

takes too much time

need extra space for storing

take extra trip to recycling center

people think I'm strange

plan trip to center at
1. same time as taking another trip
2. work to convince city garbage disposal units to pick up these things for recycling.

Activities for Energy Conservation

2.3, 2.4, 2.5 Have the students use the play, "Energerus and His Energy Kingdom," (*Play #1-9*) in order to learn more about energy conservation. Or use it as a reading exercise and let the class develop its own play using personal experiences.

2.3, 2.4, 2.5 Students listen to radio and TV commercials to find out what citizens are urged to do in order to conserve energy. Discuss in class, then have students develop their own action projects to encourage people to conserve. They could prepare radio and TV commercials and then contact the local radio and TV stations to see whether they can present a short program.

2.3, 2.4, 2.5 Students check recent magazines and newspapers to find notices about energy conservation. They could discuss these and write to the editors of the publications indicating support or suggesting other ways to convince people to conserve energy.

COAL MINING

Grade 5

Packet "A"

Filmstrip #1 - Part A

#1 Coal is the most abundant of the fossil fuels. New attention has been turned to coal even though it presents special problems. When coal contains quantities of sulfur, its recovery and burning are potentially hazardous to the environment. Upon burning, harmful sulfuric gases are released into the air. Retrieving coal from the ground without destroying the environment is another problem. In strip mining, the shale which is removed contains sulfur which turns to a harmful acid when exposed to air and moisture.

#2 One method of getting coal from the ground is an underground mine. The New Gladstone mine in western Appanoose County was one of the last to use the advancing longwall method. Rock beneath the seam of coal is undercut and removed. The weight of the roof breaks the coal down.

#3 Underground mining by machine, Jude Coal Company.

#4 The Big Ben Mine and Lovilia Number 2 mine, which are the only two underground mines still in operation in Iowa, use the room and pillar method. Two main tunnels run through the coal seam and the miners work away from the tunnels carving out rooms as they remove the coal. Pillars of coal are left as supports and result in a loss of coal. The picture shows a portion of Lovilia Mine #2 in Monroe County, Iowa.

#5 Surface, or strip mining, is another often more economical method of coal mining. Nine strip mines presently operate in Iowa. In strip mining, bulldozers chew away at the earth, leaving scars and gashes where hills and curves once were a part of the landscape. Some land in Iowa shows these scars. States are beginning to regulate strip mining and a federal law has recently been enacted.

#6 The Iowa Coal Project of Iowa State University was started in 1974. With a $3 million, 3-year appropriation from the Iowa Legislature the ICP has been working with one of these new techniques and reclaiming the land as they mine.

#7 The area was divided into sections and as each section was worked, the topsoil, glacial till, and shale were stripped off in layers and placed in individual piles. The coal was then removed and the layers put back. Bench terraces were formed and these are available for farming.

#8 Mistakes of the past indicate that today's techniques must consider the environment. Here we see how the land was left in Iowa after some of the old mining methods were used. It is extremely difficult to find plants which will grow on these spoils because of the high acidity of the soil.

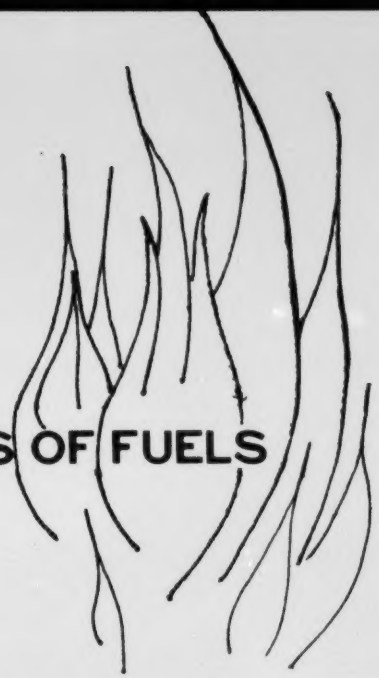
#9 Due to experiments such as those conducted by Iowa State University, by Germany, and elsewhere, we have seen that land can be improved after mining and become useful again for agriculture.

#10 Iowa's coal has a high sulfur content and contains other non-combustible materials. Attempts are being made to reduce the amount of sulfur and non-combustible materials found in coal before burning to help Iowa coal compete in the coal market. The Iowa Coal Project Coal Refining Plant was constructed on the Iowa State University campus in Ames in May 1976. Coal coming into the plant is crushed and sorted on a size basis. Larger pieces of coal are taken by conveyor to a heavy media separator where coal is added to a slurry (a watery mixture composed of powdered magnetite). The coal floats on the slurry and the impurities sink. The coal is then rinsed, dried, and taken by conveyor to the clean coal stockpile while the refuse is dried and stockpiled for burial in the mine. Since the plant began full operation, 70 to 90 tons of coal per hour have been cleaned.

#11 From 1900 to 1920 Iowa was consistently listed among the nation's top 11 coal producers. At that time there were several hundred mines in Iowa producing between four and nine million tons of coal annually. Many of these were deep mines. In 1977, there were nine strip mines and two deep mines producing 600,000 tons of coal. The Iowa Geological Survey has been working since 1973 to obtain one core sample from each Iowa county to help define the quantity and quality of Iowa's coal reserves. It may be that once again the coal industry will boom in Iowa.

BURNING

QUALITIES OF FUELS



Type of Fuel	Burn Easily?	Smoke?	Odors?	Hot Flame?
Candle				
Sliver of Coal				
Kerosene				
Alcohol				
Wooden Splint				
Natural Gas				

Energy Activities
Grade 5
Packet "A"
Student Interest Center #1

Display items such as:

LIPSTICK	CANDLE	NYLON
NAILPOLISH	MOTHBALLS	RAYON
VASOLINE	PAINTS	FERTILIZER
	PLASTIC	STYROFOAM

in an interest center

Suggestions for student action cards

#1. SELECT ONE OF THE ITEMS IN THIS DISPLAY.

DO SOME RESEARCH

a. What raw materials were used to make this product?

b. Describe the manufacturing process.

c. Note kinds of energy used in production of this product.

#2. WRITE A LETTER TO 2 MANUFACTURERS OF THE SAME TYPE OF PRODUCT (I.E. TWO DIFFERENT BRANDS OF LIPSTICK)

a. Inquire

1. about the raw materials used

2. about the manufacturing process

b. Compare information received

1. are the same raw materials used?

2. how do the manufacturing processes differ?

c. Share this information with your class

1. oral presentation

2. bulletin board

3. booklet

#3. BE CREATIVE

RECYCLE STYROFOAM PACKAGING

a. List as many uses of this material as you can.

b. Challenge a friend to come up with a longer, more creative list.

c. Share one of your creative uses with your class.(make it!)

#4. HOW OFTEN DO YOU USE PLASTICS?

a. List everything in your classroom that is made of plastic.

b. List plastics you use in your home.

c. Evaluate your list. If plastic was no longer available, how would this effect your life? What other materials would you use?

The Petroleum and Natural Gas Story

from Energy for Today and Tomorrow, San Diego, California

What you need: pencil

What to do:

Read and study this story carefully. It will help you with the puzzle in the next activity. Some words are left out. Select the correct words and write them in the blanks.

found	search	made	easier
around	moves	special	life
		rock	area

Petroleum (crude oil) and natural gas are found deep in the earth in many places (1) _____ the world. These two energy sources are called fossil fuels, because they are the remains of animal (2) _____ which existed thousands of years ago.

The petroleum geologist uses many tools in his (her) (3) _____ for oil and gas. He (she) uses a seismograph which helps locate earthquakes and instruments for identifying the strata or layers of sedimentary rock. Most oil and gas is (4) _____ in sand and shale.

Shallow wells are usually drilled with a cable tool rig. This consists of a heavy bit, which is raised and released to fall into the hole. It is like punching a hole into the ground with your pencil. Deeper holes are drilled with a rotary rig which actually drills a hole into the (5) _____. Special mud is used to cool the drill bits. A derrick (tower-like structure) is put up (erected) during the drilling to help handle the various drilling tools and pipe. Pipe (casing) is used to line the hole, preventing it from caving in.

When oil or gas is found in large enough quantities, the producing rock strata is usually fractured (broken up) with explosions or acid to make the flow (6) _____. If no oil or gas is found in commercially profitable quantities, it is called a dry hole. A large flowing well is called a gusher. If several wells are successful in the immediate (7) _____, it is called a pool. A successful well is called a producer.

Oil is transported by pipeline, truck, or tanker (ship) to the refinery. At the refinery, the crude oil is treated by many chemical processes including cracking and distillation. It is (8) _____ into gasoline, diesel fuel, jet fuel, home heating oil, kerosine, grease for lubrication, paint and plastic ingredients, as well as many other products.

Gasoline is graded according to its octane rating. Many synthetic materials are made from gas and oil by-products. Butane and propane are made from petroleum. Most petroleum products must be handled, transported, and stored carefully because of the fire hazard involved.

Natural gas (9) _____ by pipeline from the gas fields. It is often stored under high pressure in underground cavities. Natural gas is used for cooking and heating in factories, and as a fuel for steam generators which produce electricity. Many of the ingredients in clothing, paint, camera film, etc. are made from the by-products of natural gas. Natural gas is also dangerous if not handled carefully. It is often given a (10) _____ odor so that a leak can be detected.

When you have finished, read this page carefully. Many of the words will appear as answers in the crossword puzzle in the next activity.

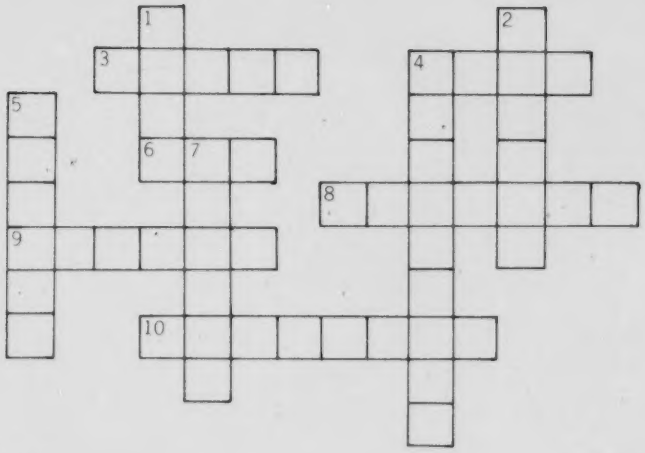
ENERGY Puzzle

What you need: pencil

What to do:

Use the information found in the last activity to fill in the blanks of this energy puzzle.

Oil Exploration and Production



ACROSS

3. Shallow wells are drilled with a _____ tool rig.
4. An area with several producing oil or gas wells.
6. A _____ hole has no commercially profitable production.
8. A tower structure over a well being drilled.
9. Layers of rock.
10. A producing gas or oil well.

DOWN

1. Small, loose grains of rock where gas or oil is sometimes located.
2. Remains of organic or plant life.
4. Crude oil in its broadest sense.
5. A type of fuel produced from crude oil.
7. A type of rig used for deep oil or gas drilling.

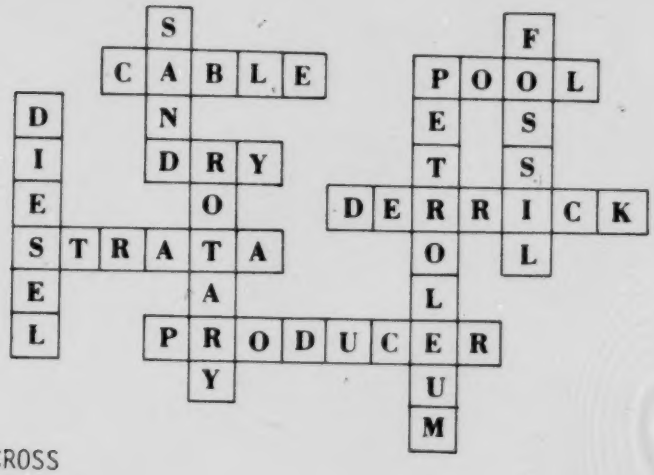
Teacher's Answer Key
for Master #1, 2

#1

ANSWERS:

1. around
2. life
3. search
4. found
5. rock
6. easier
7. area
8. made
9. moves
10. special

#2



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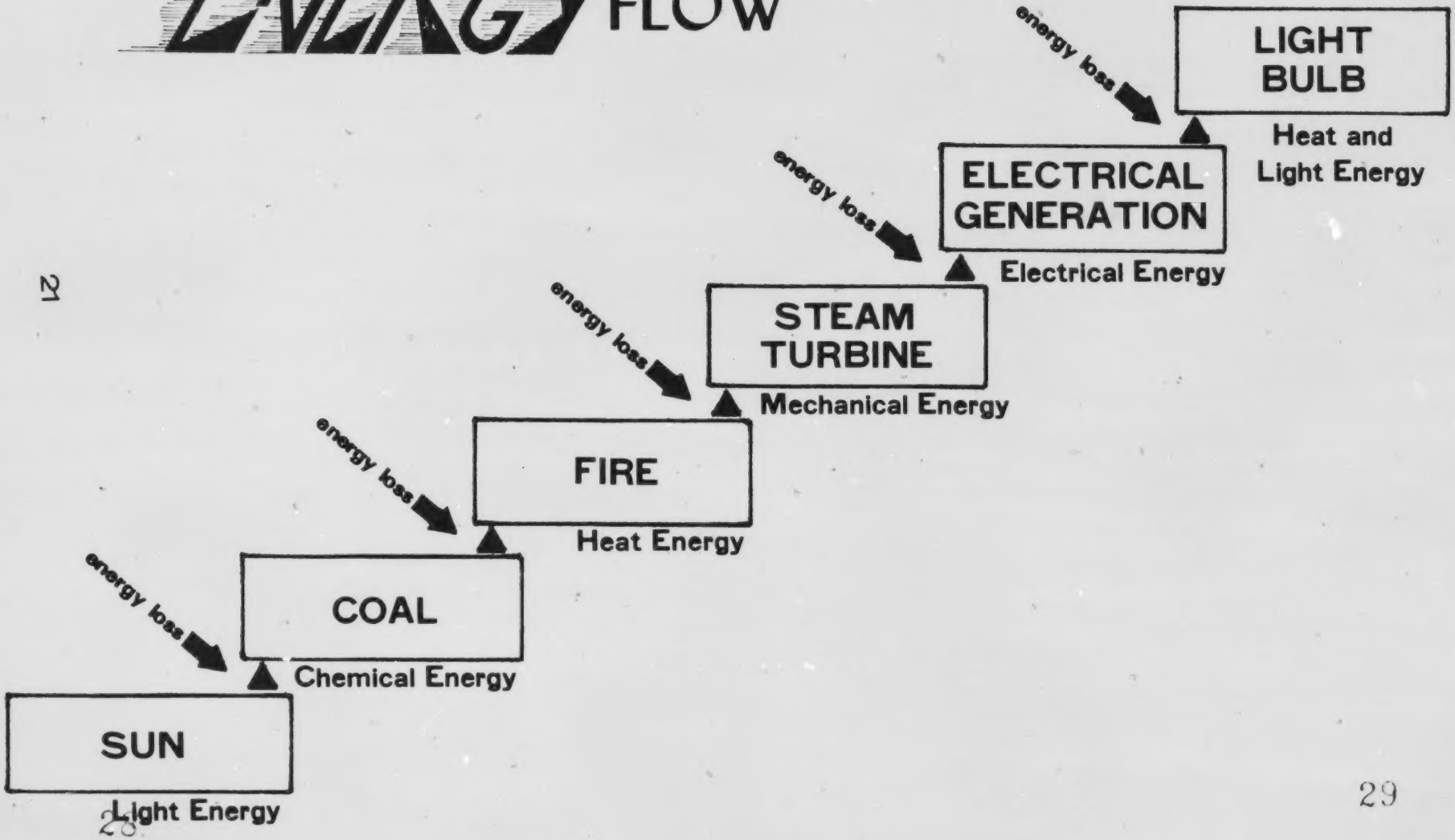
RESOURCE DETECTIVES

Object	Natural Resource(s)
(example) Blackboard	Slate

ENERGY FLOW


SUN
Light Energy
energy loss
COAL
Chemical Energy
energy loss
FIRE
Heat Energy
energy loss
STEAM TURBINE
Mechanical Energy
energy loss
ELECTRICAL GENERATION
Electrical Energy
energy loss
LIGHT BULB
Heat and Light Energy

VALUES FOCUS RULES

1. THE RULE OF FOCUSING

   Each group member is the focus person for five minutes. The attention of the group is not to shift from the focus person until his time is up or he asks to stop. Questions may be asked of the focus person as long as focus is not shifted to someone else.

2. THE RULE OF ACCEPTANCE

   Be warm, supportive, and accepting of the focus person. If you do not agree with the focus person do not express disagreement during the discussion part.

3. THE RULE OF DRAWING OUT

   Try to understand the focus person's positions and feelings. Ask questions which will help you to understand the focus person's feelings. Make sure your questions do not shift the focus to yourself. Also, make sure you do not reveal negative feelings.

Energy Activities
Grade 5
Packet "A"
Master #4
2.1, 2.2, 2.5

AGREE/DISAGREE ENERGY WORKSHEET

Name _____

Directions: Circle the response which most closely indicates the way you feel about each item.

SA = Strongly Agree
AS = Agree Somewhat
DS = Disagree Somewhat
SD = Strongly Disagree

Item	Response			
1. There is an energy shortage.	SA	AS	DS	SD
2. We should stop using all fossil fuels immediately.	SA	AS	DS	SD
3. We do not have to worry about using up our energy.	SA	AS	DS	SD
4. Plastics, styrofoam, nylon, lipstick, etc. should no longer be manufactured.	SA	AS	DS	SD
5. If we cut our energy uses we will have to go back to living the way people did in the 1900's.	SA	AS	DS	SD
6. Fuels are necessary for our energy use.	SA	AS	DS	SD
7. Laws should be passed to make people use less gasoline and less electricity.	SA	AS	DS	SD
8. Energy would be saved if all stores were closed on Sundays.	SA	AS	DS	SD
9. I would encourage my family to save energy.	SA	AS	DS	SD

ENERGERUS AND HIS KINGDOM

Setting: Energerus' Kingdom far off in space

Time: 1973

Our story begins in the sitting room of the kingdom where King Energerus is anxiously pacing the floor. Everyone in the kingdom seems quite upset.

King: Oh my, Oh my, Oh my, Oh my, Just look down there at those Earthlings. What a mess they are in. Don't they know that nothing can be done without energy?

Coalus: King Energerus, it's not their fault. They can't help that they have messed up their energy situation.

King: Ohhhhhhhhhhhhhhhhhhh, How sad it all is.

Oilus: What has happened is that the country's demands for energy has exceeded its ability to supply it.

Atomus: You know what I think is the problem down there is that their production and uses are putting a heavy strain on their energy reserves.

King: Oh, Atomus, that doesn't help at all. Just look down there at all that energy confusion.

Windus: Don't those Earthlings know that if there is no energy, the rivers would not run, the stars would not shine, there would be no sunlight and everything would be frozen and lifeless and still?

All: Oh, Windus, how terrible (all groan).

Coalus: We must help them!

Atomus: But how?

Oilus: We must help them with their energy crisis. You all know that whenever work is done, the force that is needed is supplied by some kind of energy.

Atomus: Yes, but how, how?

Oilus: We must help them with their energy crisis. You all know that whenever work is done, the force that is needed is supplied by some kind of energy.

Atomus: Yes, but how, how?

Coalus: Every day the average man, woman and child in the U. S. uses nearly four gallons of oil, 300 cubic inches of natural gas, 15 lbs. of coal and smaller amounts of other energy. Energy is the mysterious something that makes work possible.

Windus: Without energy, we all agree, it would be impossible for their life to go on.

King: We must help them for you all know that having enough energy available and using it properly is important to the progress and happiness of all mankind.

All: Yes, that's right, ...

Atomus: The most important happening will take place on earth as energy becomes available. Energy determines the standard of living of the Earthlings.

Coalus: We must help the Earthlings realize that energy control makes it possible for people to live better. Fuller use of energy helps people produce more food, get food and clothing and other necessary things with less work.

Windus: Do you think the Earthlings know about energy, know things like energy can be changed from one form to another or that energy is neither created nor destroyed, that energy can be stored, that energy can be carried from place to place?

King: Oh, I don't know what they know--all I know is they need help. They are having an energy crisis and their energy situation is very uncertain.

All: Let's help them, let's help them.

King: All right, all right, I have a plan. I have sent for (King claps hands) Mr. E. Conscience and his sidekick Jr. E. Conscience. Bring them forth! (Atomus and Oilus escort them in to the king and they bow before the king). You have a difficult task before you, my friends. The Kingdom of Energerus is depending upon you.

Cons. & Jr.: How can we serve you, our King?

King: I must leave now but the other gods will tell you your assignment. And may you have the energy to carry out your mission with success. (King exits) (all bow)

Coalus: Mankind the last century has been using up energy at a greater and greater rate.

Oilus: Some people think that all the oil will be gone by the year 2000.

Coalus: And most of the coal by the year 3000.

All: Moan and groan.

Cons. & Jr.: What can we do?

Windus: You must go to Earth and give the Earth people wisdom and insight on how to handle their problem.

Cons.: Fine, Fine. We will go and help the people of Earth. We will help them think about other energy sources.

Jr.: We can help them learn how to better use what they have already.

Cons.: One touch from us and the knowledge of the Energy Kingdom will be theirs.

Jr.: We will help the earth people help themselves.

Cons.: Don't worry, Gods of the Energy Kingdom, we will succeed--our mission will be a mission of triumph!

All: Good luck...Good bye...Yea for Mr. E. Conscience... Yea, Yea, Yea.

(All Exit)

Narrator: Mr. E. Conscience and Jr. E. Conscience have arrived on Earth to begin their mission.

Cons.: Now don't be nervous, Jr., we have a job to do and we will do it. The Gods of the Energy Kingdom are depending upon us.

Jr.: (Nervously) I know, Mr. Conscience--but it's such an enormous undertaking and if we don't succeed it would be just....

Cons.: Don't even think that way, Jr. We will succeed--there is no doubt. Hey look, that looks like a good place to start.

Narrator: Mr. E. Conscience and Jr. E. Conscience are looking in the window of a house on Earth in which a mother and daughter are in the kitchen talking.

Mother: Stephanie, you have left the TV on in the other room and no one is watching it.

Steph.: Aw, Mom, I'll be going in to watch some more later on. Hey, Mom, this faucet is still leaking. Did you call the plumber yet?

Mother: Not yet. I have been meaning to but I haven't gotten around to it. Stephanie, will you put this one potato in the oven to be baked for your brother for supper?

Steph.: Sure, Mom. Say, Mom, did you know the iron is still on?

Mother: Oh, I'll be ironing after dinner--just let it be. Dear me, someone has left the refrigerator open all this time. Stephanie, don't open those drapes and let the sun get into my eyes.

Steph.: Okay, Mother, I'll leave the drapes closed. Mother, isn't that cake mix mixed yet? That beater has been running for 1/2 hour.

Mother: Yes, I'm sure it's mixed but a little extra beating for good measure never hurts.

(Conscience and Jr. jump into room, dance around and give little nudges to both)

Steph.: (Enthusiastically) Mother, I'll turn off the TV till I need to use it again and I'll call the plumber for you right now.

Mother: Fine, Stephanie. And I'll put the rest of the dinner in now and get it all cooked while the oven is on. Daughter, go turn off that iron please until I'm ready for it. Let's remember to be careful about that refrigerator door.

Steph.: Mom, I'm going to open the drapes and let the warm sun shine in.

Mother: Fine idea and stop the beaters of the mixer too, please. The cake mix is done, I'm sure. You know, daughter, we must be more careful in our use of appliances and such. We need to do our share to help conserve energy.

Steph.: Yes, Mom--you're so right! (They hug and skip off stage.)

Cons.: Looks like we're off to a good start. But we have a long way to go.

Jr.: Looks as if a car is coming down the road. Maybe we can do some good there. (Car drives onto stage.) I'm going to give them the old wisdom pinch right away.

Driver Danny: I am just going to have to use my car more efficiently, Angie. I'm going to get this car a good tune up so I have good fuel economy. I'm going to have its air filter cleaned so it won't restrict the air flow and use extra fuel. I'm going to check the spark plugs so they don't misfire.

Angie: Driver Danny, I'm so glad to see you driving at 50 mph. You know they say you use 25 to 30% more gas to drive at 70 mph than 50 mph. Let's stop and increase the tire pressure a little--that saves gas too.

Danny: Good idea. (One jumps out and adjusts tires.) You know, Angie, tomorrow when I start the car in the morning I'm not going to let it run for such a long time to warm up and I'm not going to jack-rabbit out of the garage.

Cons.: If we really want to help the Earthlings we need to look at the source of some of their problems. We need to go to the oil fields and see what's going on there and give them our wisdom whack!

Jr.: Good idea, Boss. Let's head West.

Cons.: There are some oilmen over there.

(They sneak around the oilmen and give them a little hit and flee away.)

Oilman 1: We must make the people aware of the importance of oil.

Oilman 2: Yes, but what's more important we must inform the people on how to conserve the oil.

Oilman 3: I don't think the public realizes that it takes millions of years to make an oil field but only 20 to 30 years to use it up.

Oilman 5: Present and future demand for oil is massive. To meet the expected growth the industry would have to add 4 million barrels a day of producing capacity a year.

Oilman 4: I wonder if the people realize that oil is the number one prime energy source. I wonder if they realize that a ton of oil contains twice as much energy as a ton of coal and it can be handled with pumps and can be shipped in tankers across the ocean and pumped through pipelines to refineries and shipping ports.

Oilman 3: It is hard to realize that the United States has large but not unlimited supplies of oil. We must begin to get our oil from those hard-to-reach places.

Oilman 2: The North Slope of Alaska was a major find several years ago, but so far not a drop of Alaskan oil has been piped to the lower 48 states.

Oilman 1: Offshore wells on the continental shelves are a source of oil but they are expensive to drill.

Oilman 2: There are many problems--oil spills into the ocean, legal difficulties, high prices for oil, political changes which interrupt the flow of oil from other areas of the world.

All: Yes, yes, you're right--what will we do, etc.

Oilman 4: I've got it. You know the song the men of the oil fields sing--we must bring that song to the people.

Oilman 5: Here come some oilmen now singing their song. Listen! (Oilmen enter singing their song.)

Chorus: (Oil song)

Oilman 1: That song has the message that the people must hear. We will bring that song and its message to the people. (All exit singing song again.)

Cons. & Jr.: (Jumping up and down) We've done it again. We have helped the people of Earth help themselves.

Jr.: I'm still worried about their future. You heard those oilmen say that the oil isn't limitless.

Cons.: You're right to worry, Jr., but Earth's scientists may be the answer to their problems. We need to find some scientists so we can give them the old Energerus Kingdom Kick.

Jr.: You're right, Mr. E. Conscience--they will need all the help they can get. Look up ahead--there seems to be a laboratory.

(Some scientists are working at a table in a laboratory.) Conscience and Jr. give each a little kick.

Scientist 1: Don't worry men--we will come up with new energy sources--remember necessity is the mother of invention. I remember that after 1942 we learned how to make nuclear energy from one kind of uranium.

Scientist 2: There is another way of using nuclear energy; with hydrogen fusion. We can use a kind of hydrogen atom as fuel. There's lots of hydrogen atoms in the oceans.

Scientist 3: This would give us enough energy to last for 1 million years or more.

Scientist 2: How about making use of heat energy underground?

Scientist 4: Yes, the interior of the earth is hot, and if we could learn to make use of the heat we would have an energy supply that would last for ages.

Scientist 3: What about turning directly to the sun and collecting solar energy? Already batteries have been developed that change the radiant energy of the sun directly into electric energy.

Scientist 1: Many substances are potential sources of energy. Our prime energy sources, nuclear power, hydroelectric power, coal, natural gas and oil may only be the beginning.

Scientist 4: The world is beginning to climb to a new level of energy use. If we can learn to control energy there will be a standard of living so high that the poorest person alive can be sure of having enough to eat, of being properly taken care of when he is sick and of getting as much education as he can use.

Scientist 2: Having energy available and using it properly is important to the progress and happiness of all mankind.

Scientist 3: All right, men, study, investigate, experiment, invent, think, design, discover and plan. We scientists will control energy and make it possible for people to live better.

All: Yeah--hurray--wonderful...etc.

(Conscience and Jr. dance in very happily.)

Cons.: Jr., all is going well but there is one more stop we must make before we return to the Kingdom.

Jr.: Where is that, Mr. E. Conscience?

Cons.: We must visit the men who make the decisions, the leaders of the country--we must bring the touch of wisdom from the Kingdom of Energerus to the Governmental officials.

Jr.: Good idea. I hear there are many of these kind of Earthlings in Washington, D. C. Hey, that must be Washington, D. C. See the White House and the Capitol Building? There seem to be some government officials.

Cons.: Let's make sure we give each the Energerus touch of wisdom. After each is touched they will make a profound statement.

(They dance around touching each of the government officials.)

(Each steps forward with a sign around their neck indicating who they are.)

President: Mankind depends on natural resources. The well-being of individuals and the economic welfare and political strength of nations depends on resources.

V-President: The possibility of rationing depends on how well the people will cooperate with volunteer programs of energy conservation.

Congressman: Our energy crisis and the resulting shortage of petroleum products is posing a real threat to all of the small businesses which rely on these supplies for their finished products. Whatever programs develop for allocation or rationing of petroleum products--consideration to America's small businesses must be given.

Governor: I urge all (Iowans) to reduce their energy consumption on a voluntary basis. Unless voluntary action is taken the federal government will step in and further encroach on private lives.

Senator: Congress will have to adopt some resolutions and practical programs to meet the energy crisis.

Deputy Secretary of Treasury: The FEA, Federal Energy Administration, provides an umbrella energy force. This agency will manage the fuel crisis.

Secretary of State: Our goal must be a successful Mid-East peace and a conclusion of the war and the Arab fuel embargo lifted.

Cons.: It looks as if Earth is in good hands. These leaders of their nation will give them the guidance and direction they will need to overcome their Energy Crisis. I think it is time for us to return to the Energerus Kingdom. Our mission has been accomplished.

Conscience and Jr. leave stage - circle around room - (Meanwhile kingdom is set up on stage and when they come back on stage all the Gods stand up and give ovation.)

Narrator: Our story now takes us back to the Kingdom of the Gods.

King: Welcome, welcome. You have done a fine job. We are proud of you. People of Earth will make it because of your help.

Coalus: Yes, King, but another reason the Earthlings will do just fine is because of the children. Just look down there and listen to the Earth's children. They know they can change their environment and improve their resources.

Oilus: Just listen to their song.

(All but Gods sing.)

The End

OIL SONG

Tune: I've Been Working on the Railroad

We've been working in the oil fields, working all day long,

Supplying three-fourths of the energy, that heats our homes and schools,

Oil products go far, We use them everyday,

Like kerosine and asphalt, Consumer you will pay.

Consumers won't you think, consumer won't you plan,

No matter how hard we do our work,

No clothes, or plastics we will make,

Unless conserving is the attitude you take.

WE HAVE THE WHOLE WORLD FOR WHICH WE CARE

Tune: He's Got the Whole World in His Hands

We've got the whole world for which we care,

We've got the whole world for which we care,

We've got the whole world for which we care,

We've got the whole world with energy concern.

We've got the natural gas burning low,

We've got the crude oil under control,

We've got the coal fields with a watchful eye,

We've got the hydro power flowing by,

We've got the nuclear power developing more,

Got electricity generating by the score,

Got government and scientists working with a plan,

We've got the whole world with energy concern.

ENERGY CONSERVATION ACTIVITY PACKETS

GRADE 5

PACKET "B"

TEACHER BACKGROUND MATERIAL
Grade 5 - Packet "B"

Fifty years ago coal mining in Iowa flourished but today there are only a few mines remaining. However, interest in coal is causing new interest in Iowa's coal. Coal is Iowa's only naturally occurring fuel with large reserves. Other potential fuel sources in Iowa are oil (a small amount was found near Keota in Washington County) and energy from agricultural products. Oil can be obtained from manure and corn-stalks or cobs but the processing is expensive. Solar and wind sources for energy are also promising for Iowa; however, these most likely will not be major contributors for at least a decade.

Iowa's coal is sufficient to supply the coal needs of the U.S. for six years and in Iowa would last about 500 years. Iowa has large amounts of coal but it is not easy to find and mine due to variable layers. Some of the coal seams are seven feet or more in thickness but some are less than one inch thick and less than a few 100 acres.

Nuclear energy supplies about 25% of Iowa's energy needs. Three plants--Duane Arnold Energy Center at Palo, Iowa; Cooper Nuclear Station at Brownsville, Nebraska; and the Quad Cities Station at Cordova, Illinois--supply Iowa. However, concerns have been raised as to safety, radiation, and disposal of waste. Geothermal energy has not been found in Iowa and hydroelectric power has potential for only 1% of Iowa's energy consumption.

About 98% of the fuels used in Iowa are imported. Coal is the only source native to Iowa, yet of the amount used in the state in 1973, only 12% came from Iowa with the rest being imported.

Coal use in Iowa began in the mid 1800's and coal was not really mined, as we think of mining, just picked up from exposed seams which were along river valleys. Once the coal was picked up it was transported to a local home or commercial operation by mule. Until the early 1880's all mine work in Iowa was accomplished by human or animal labor. Several types of mining then took over.

As of 1976, there are two underground mines in operation--one near Knoxville and the other in Lovilia, northwest of Albia. The largest operating underground shaft mine is the Lovilia Coal Company which employs 21 workers, with 16 people working underground. The remainder of coal mined in Iowa comes from strip mines. In 1917 there were about 18,000 people employed in mining coal but by 1976 there were less than 100. At one time 450 mines operated in Iowa, now there are only 11 in operation.

Some of the Iowa coals contain as much as 7% sulfur when mined, and therefore are not environmentally acceptable as fuels. Cleaning methods can be used to reduce the sulfur content; however, in the past these have been extremely costly. Iowa State University has a coal

preparation plant which can be moved to the coal site rather than transporting the coal to the plant. In a study of the Ambient SO_2 Air Monitoring Data, 491 air samples from eight locations in the Ames area showed only one location exceeded standards for only 24 hours. In the Des Moines area 549 air samples were analyzed and in one location standards were exceeded for one 24 hour period.

Another environmental problem associated with coal is the effect of strip mining. Acid spoil could leave large areas with little vegetation but proper planning can prevent most problems. In Iowa in the spring of 1975, legislation was passed which should guard Iowa's environment if surface mining continues. After mining is complete a vegetative cover must be established, the operator must post a bond to insure the mined acreage will be reclaimed, and application for mining permits must include plans for rehabilitation. New mines in Iowa will most likely be strip mines but deep mines will probably be the source of most of Iowa's coal.

Many of the activities in the 5th grade packets require between 20 and 40 minutes depending upon the length of discussion. Some of the activities require research and/or group work and are long-range in nature. There are also activities which are designed to be done at home and follow-up provided in the classroom.

CONCEPTS AND OBJECTIVES IN ENERGY CONSERVATION

Grade 5 - Packet "B"

Energy

1.00 The learner recognizes the involvement of energy in Iowa's past, present, and future.

1.1 Investigates the sources of energy in Iowa.

1.2 Investigates the uses of energy in Iowa.

1.3 Becomes aware of future sources of energy in Iowa.

1.4 Recognizes that Iowa's economy is related to availability and use of energy.

1.5 Becomes aware of what Iowans can do to conserve energy.

Personal Accommodation

2.00 The learner will develop a conservation ethic in regard to energy.

2.1 Acquires experience in making decisions and accepting the consequences of the decisions.

2.2 Expresses personal value that is received from energy conservation.

2.3 Chooses activities which will utilize energy conservation in making contributions to the school and community.

2.4 Investigates methods concerned citizens use to improve the future of energy solutions.

2.5 Develops an idea of type of life-style desired in consideration of the amount of energy required.

2.6 Explores the implications of a life-style in their home and community that results from an energy conservation ethic.

ENERGY ACTIVITIES
Grade 5 - Packet "B"

1.00 The learner recognizes the involvement of energy in Iowa's past, present, and future.

Iowa's Energy Sources

1.1, 1.2 Examine samples of oil and coal. This can be a review of Packet "A" or portions of Packet "A" could be inserted at this point.

1.1 Use *Transparencies #1, 2, 3* in leading a discussion about the location of oil, coal, and gas fields in the United States. Pay close attention to any sources which may be in Iowa.

1.1 On a map of Iowa, identify the location of coal, oil, or natural gas deposits. Students could begin a folder which would contain information on Iowa's energy, or this could be a chapter of a complete Iowa folder. (*Transparency #4, 5*)

1.1, 1.2 Show a map of Iowa's minerals. Make a bulletin board using the map. Show where each mineral is obtained and where abandoned mines are located. Children write to the major mining companies to find out methods of mining, energy used in the process, products made from the minerals, and what they feel will happen when the resources are depleted. Maps showing Iowa's minerals may be obtained from the Iowa Geological Survey, 123 North Capitol Street, Iowa City, Iowa 52242.

1.1 Show slides or pictures of Northern Natural Gas Company's pumping station, petroleum product storage tanks in Polk County, Solid Waste Recovery, the Duane Arnold Center, etc. (*Filmstrip #1 - Part B*) This will provide the students with an idea of energy sources available in Iowa and to Iowans.

1.1 Students may be interested in studying and singing songs written and sung by coal miners. "Sixteen Ton" is appropriate, as are many others. Study the words to find out about a miner's life.

1.1 Study the ways electrical energy is produced in the state.

1.1 Show the film, "The Last Pony Mine," by Dorothy Schwieder and Richard Kraemer of Iowa State University. The booklet, Iowa's Coal Mining Heritage, provides supplementary material for the film. It was prepared by the above people and published in 1973.

Iowa's Energy Uses

1.2 Use *Transparency #6* which shows distribution of Iowa's Energy Consumption. Discuss with the class. Then show *Transparency #7* which indicates the growth of energy consumption in Iowa. This should provide the students with a clearer picture of Iowa's energy uses.

1.2 Have students describe both the present and historical uses of the windmill. Research should be done, a visit to a farm with a working windmill could be arranged, or a farmer invited to visit the class and explain uses he has made of the windmill. Discuss use of wind energy--advantages, disadvantages. It would be helpful to use the December, 1975 issue of National Geographic with the article, "New Energy from an Old Source: The Wind," by Roger Hamilton and Emory Kristof, p. 812-829.

1.2 Students discuss how farmers use energy in order to produce food. How have farmers increased their energy use? Has this increased the amount of food they can produce? (Consider fertilizers, larger machinery, etc.) If it is possible, invite a few farmers to share with the class what types of energy they use and how they use it in agriculture. Show film, "Seeds of Survival," from the Living History Farms, Rural Route 1, Des Moines, Iowa 50322.

1.2 Visit the large energy users in your community such as factories and industries. Have them discuss how they use energy, where they get their energy, and what they are doing to conserve energy. If it is not possible to visit these places, invite representatives from them to the classroom.

1.2 Inventory your home block (or apartment floor, or farms along your road) to determine the percentage of homes using the various types of energy. Use *Data Sheet #1* for collection of information.

1.2 Construct a mobile of ways Iowa uses energy. It should include agricultural, residential, commercial, and industrial areas.

1.2 Research possible energy reasons why cities in Iowa are located where they are. (You might choose to investigate those in your county instead.) Check the county courthouse for early maps and talk to people who know some of the history of your county.

Iowa's Future Energy Sources

1.3 Contact the Energy Policy Council and other interested organizations to find out what is being done in Iowa to utilize alternative energy sources. CURE, 1342 30th Street, Des Moines 50311 (515/277-0253) has speakers available and a resource packet which has projects and lists 100 Iowa solar resource persons. The Iowa Energy Policy Council's solar report

maintains Iowa could use 4% of Iowa's land space to provide all Iowa's fuel needs. Solar energy can be taken from agricultural waste, municipal waste materials, and raising special quick growing crops for fuel.

1.3 Students prepare a display/displays of the types of energy sources Iowa could depend upon in the future. Prepare a program of Iowa's future energy sources. Include slogans, slides of models, songs, poems, commercials, skits, etc.

1.3 After research into the types of alternative energy courses, have the students design models of these sources which could be used in Iowa. This could be done jointly with grade 6 as they do extensive research into alternative energy sources. Once the models which could be used in Iowa have been made, displays could be developed for use in public buildings.

Iowans Can Conserve Energy

1.4 Research how Iowa grew--what sources of energy caused the largest growth? (sun for agriculture, coal) What would happen in Iowa if other sources of energy were not available?

a. What kind of jobs would be eliminated?

b. What kind of jobs would become available?

c. Which industries would have to leave?

1.4 Compare pioneer Iowa and its use of energy to present-day Iowa. Compare life-styles and uses of energy. This could include a trip to historical locations in the study of life long ago.

1.4, 2.4, 2.5 Write a speech for the governor of your state. It should be a speech he could use in addressing the legislature on the effect of energy use on the state's environment. The speech could also include proposals for ways the state could work together on energy conservation.

1.4, 2.4 Compose songs (use tunes from popular songs or compose your own) and poems which describe energy in Iowa and what can be done about energy conservation.

1.4 If possible, plan a field trip to observe solar energy being utilized. The following brief list should help to some extent in finding a location.

Homes in Ankeny, Seymour, Ames, Sioux City
Raccoon Valley Bank in Adel
Solar furnaces in Indianola, Ogden, Davenport
Solar grain drying in Reinbeck, Vinton, Iowa State University
Resort in Spirit Lake

Hog house heating in Hubbard and New Sharon
Gymnasium at Scattergood School in West Branch
Business in Dubuque
Commercial building in Ottumwa

Specific addresses may be obtained from the local chamber of commerce or CURE.

2.00 Personal Accommodation: Conservation Ethic

Making Decisions and Accepting Consequences

2.1 Contact local business and industry to determine how they are being effective in energy conservation measures. If the students feel letters to the editor, suggestions to the business and industry, and posters will help everyone do a better job, encourage them to accept an activity and follow through.

2.1, 2.6 Ask students to find explanations why people do not wish to do without the convenience items that consume electricity.

2.1, 2.3, 2.4 Interested students could form a club or committee to monitor the energy consumed in the school and meet with the principal and custodian to discuss findings and possible solutions.

2.1, 2.3, 2.4 Values in Action--Values Clarification Activity

This activity requires the students to actually become involved in a planned action to bring about some desired change and evaluate the results of their actions.

The students are asked to make a list of five changes they think would effectively reduce energy consumption in Iowa or their town. Then the teacher distributes the work sheet, "You Can Do Something About It," (*Master #1*). Each student completes the form by placing a check (✓) by any of the alternatives which he has ever done, and an asterisk (*) next to any he would consider doing.

The teacher then asks the students to select one of their five changes and determine which two actions they will take. For one month they are to actively engage in both of these actions to bring about a change. After one month the class discusses what they did and the results that occurred.

2.1, 2.3, 2.4 I Urge Telegrams--Values Clarification Activity

The teacher gives each student a 4 x 6 card or a blank Western Union telegram form. He asks the students to choose a real person and write a telegram to that person beginning with these words: "I urge you to..." The message is to consist of 15 words or less (or 50 words for a night letter). The student is to sign his name to the telegram. The telegram should reflect something about energy the sender feels is important. The students may read their telegrams to the class or tape them to the walls and take a walk to see what others have written. In order that these telegrams, and the students'

efforts, are directed specifically towards energy concerns in Iowa, direct the students to write their telegrams to real people in Iowa that would make a change and also to Iowa's representatives in congress.

2.1, 2.3, 2.4 Self Contracts--Values Clarification Activity

The teacher tells the students they will be making a contract (agreement) with themselves about some change they would like to make in their lives in regards to energy. An example might be: "For the next week, I will turn out the lights each and every time I leave my room, thus saving electricity." Students are to sign their name at the bottom if they really intend to carry out the contract. After one week the class can take time to share and discuss how well they are doing. The teacher should also participate in this activity. Encourage the students to make specific and realistic contracts which can be completed.

Energy Conservation Activities

2.2, 2.3 Organize an essay contest. This could be entitled "How Can Energy Be Saved in Iowa?"

2.2, 2.3, 2.4 Arrange with a local radio station for students to present ideas on how local citizens could conserve energy. This could also include original songs and poems. The program could be in the form of a talk show or it could also be a play.

Life-Styles and Energy

2.5 Research the types of uses of energy today. The teacher could use a picture of an historical scene or building or utilize a field trip to a museum, historical building, or specifically a 1900 building. Compare the life-styles. Which would they prefer? Why?

2.5 Rank Order--Values Clarification Activity

This activity gives students practice in choosing from alternatives and then publicly affirming their choices. The teacher explains that he/she is going to ask some questions which require them to make a value judgment. Students are given three or four alternative choices for responding to each question and asked to rank order these choices. The question is read by the teacher, choices are written on the board, and six to eight students in turn give their rankings. Students may say, "I pass." Class discussion may follow after the teacher gives his/her rankings (if desired).

Rank Order Questions

1. Where would you rather live?

_____on a farm
_____in the suburbs
_____in an inner city

2. If you had two hours to spend with a friend, which would you do?

_____go to a movie
_____watch TV
_____go for a walk
_____stand on a corner

3. What is the most serious problem in the United States today?

_____energy shortage
_____crime prevention
_____inflation

4. Which is the most economical method for traveling to work?

_____automobile
_____bus
_____walk
_____bicycle

5. What would you most like to do with your friends during your leisure time?

_____play a sport or game
_____go to the movies or watch TV
_____just talk

6. If you had to go on a long trip, how would you rather travel?

_____by train
_____by airplane
_____by ship
_____by automobile

7. Where would you like to spend your vacation?

_____at the shore
_____in the mountains
_____at your grandmother's house
_____camping near home

8. Which would be hardest for you?

_____live the way people did in 1900
_____live the way you do today
_____use energy conservation measures each day

9. Which source of energy is the best?

_____solar energy
_____nuclear power
_____geothermal energy
_____fossil fuels

2.5 Are You Someone Who?--Values Clarification Activity

The teacher provides the students with copies of *Master #2*. On this sheet the students respond to each item with "Yes," "No," or "Maybe" by circling one of the symbols (Y, N, or M). After completing this each student reads to the class one question which he/she has answered with an emphatic "yes" or "no" and tells why he/she answered that way. Then have the students make their own lists of "I Am Someone Who..." sentences.

2.5 Baker's Dozen--Values Clarification Activity

The teacher asks the students to make a baker's dozen list (13 things) of things they personally use around the house which make use of electricity. This should include anything with plugs that they use frequently. Next, direct them to draw a line through the three things they could live without the easiest. For example, what three things could they give up most easily if there was an acute power shortage and every home was asked to cut down on its use of electricity. Then have them draw circles around the three things they would not give up until the last. Students are asked to volunteer to read their circled and crossed out items. From this exercise they could write "I Learned Statements" where they evaluate what they did and write two or three brief statements beginning with "I learned that I... ."

Grade 5

Packet "B" Filmstrip #1 - Part B

#12 Energy not only is important in our personal, everyday lives, but it also has an important place in the growth and economy of a state. Almost all of Iowa's energy comes from imported fuels. In 1975, less than two percent of the energy consumed in Iowa was produced in Iowa. The four major fuels used in Iowa are petroleum, natural gas, coal, and nuclear energy.

#13 Demand for natural gas has increased rapidly in both Iowa and the nation. In Iowa in 1975, nearly 37 percent of the total energy requirement was met by natural gas. In the same year over 51 percent of the state's non-transportation energy demand was met with natural gas. Northern Natural Gas Company serves the northern two-thirds of Iowa. Near Redfield, Iowa, you may observe their underground storage field, begun in 1953. The gas flows into porous rock where it is stored.

#14 Natural gas pumps, located at the Redfield storage field, pump gas into reservoirs 1750 feet to 2700 feet below the farmland.

#15 North of Des Moines near Interstate 80, there is a large LNG (liquefied natural gas) storage facility operated by Iowa Power and Light Company. Northern Natural Gas and Peoples Natural Gas Company both have LNG facilities in Hancock County, Iowa.

#16 Petroleum is the largest single source of energy in the United States and Iowa. In 1974, over 64 percent of petroleum products in Iowa were used for non-transportation purposes. They were consumed in space heating of homes, offices, and factories. Here we see petroleum product storage tanks located in Polk County.

#17 The only commercial nuclear generating facility operating in the State of Iowa is the Duane Arnold Energy Center near Palo. This power plant began operation in 1974. All of its megawatts are used in Iowa. The Quad Cities plants at Cordova, Illinois; the Genoa Nuclear Generating Station at Genoa, Wisconsin; and the Cooper Nuclear Station near Brownsville, Nebraska, also provide megawatts for use in Iowa. During the last part of 1974, with all four plants in operation, nuclear electricity was responsible for 45 percent of all the electricity sold in Iowa.

#18 Coal usage in Iowa decreased slightly in 1974, but rose slightly in 1975. In the first half of 1975, less than nine percent of Iowa's coal usage consisted of coal actually mined in Iowa. Over half of the coal used in Iowa comes from Illinois. In the center of the picture is the Iowa Coal Project demonstration mine located about seven miles southwest of Oskaloosa. Also shown is the Childress site in the upper left and in the foreground a mine operated by Star Coal Company. Filmstrip #1 - Part A for 5th grade goes into detail about coal mining in Iowa.

#19 Iowans do have two other energy sources readily available - wind and solar. Wind power was used in the past, particularly by farmers, to pump water, provide power, etc. One corn farmer of today is still living a life with wind power. John Lorenzen of Woodward, Iowa, uses windmills to supply his power. He couldn't see anything wrong with wind machines and decided against hooking up to the power lines which ran near his farm. His wind generator supplies the electricity needed to power his T.V., vacuum cleaner, dishwasher, etc.

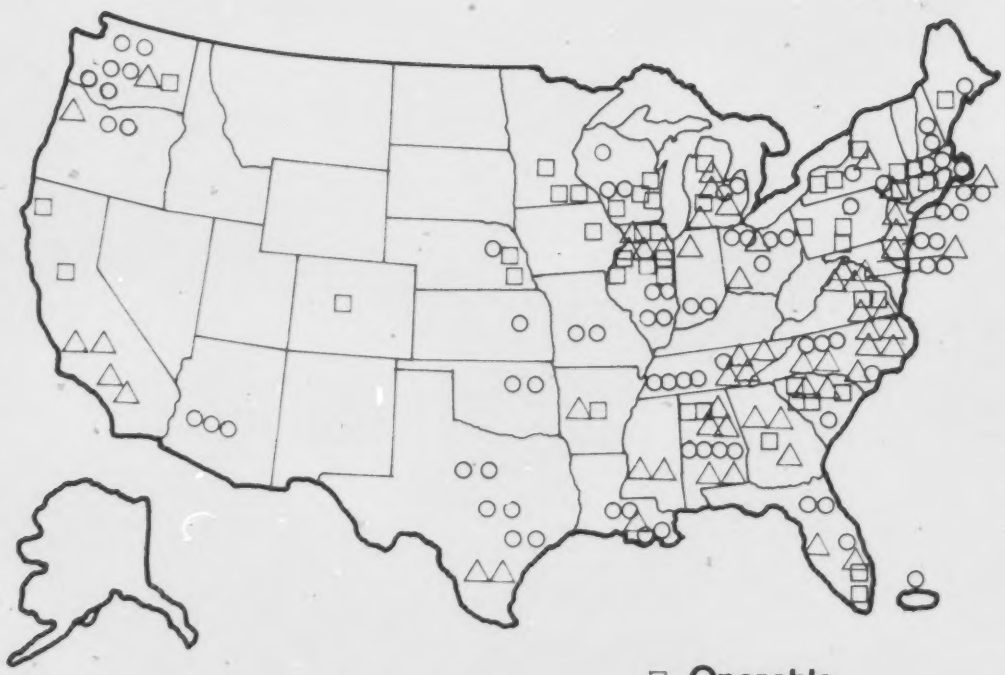
#20 When the wind is slack he has storage batteries ready.

#21 More and more people in Iowa are designing homes and buildings which utilize energy from the sun. Scattergood School at West Branch, Iowa, utilizes solar energy to heat their recreation building and the water which is used for showers. In April, 1976, Scattergood received a grant from the U.S. Energy Research and Development Administration (ERDA).

#22 Many Iowa builders and architects are beginning to develop commercial buildings that utilize solar energy. The Raccoon Valley State Bank of Adel will be able to receive approximately 50 percent of its energy requirements from the sun. The sun is also being used for grain drying in Reinbeck, Vinton, and at Iowa State University.

Energy Activities
Grade 5
Packet "B"
Transparency #1
1.1

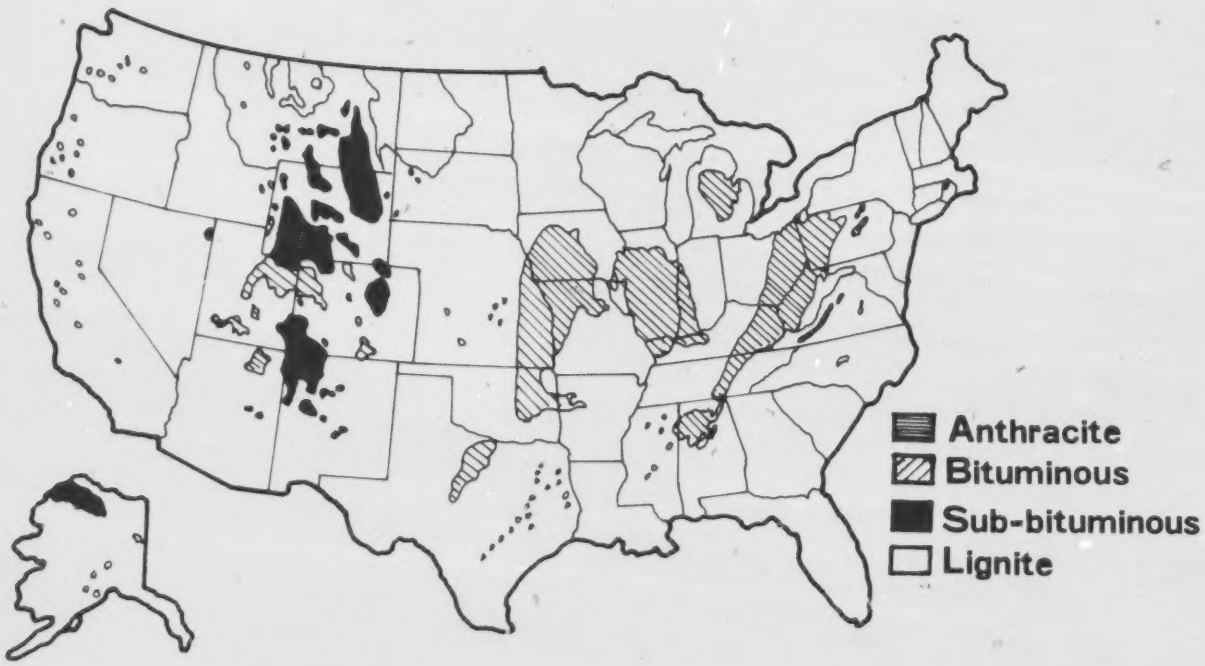
NUCLEAR POWER REACTORS IN THE U.S.



□ Operable
△ Being Built
○ Planned

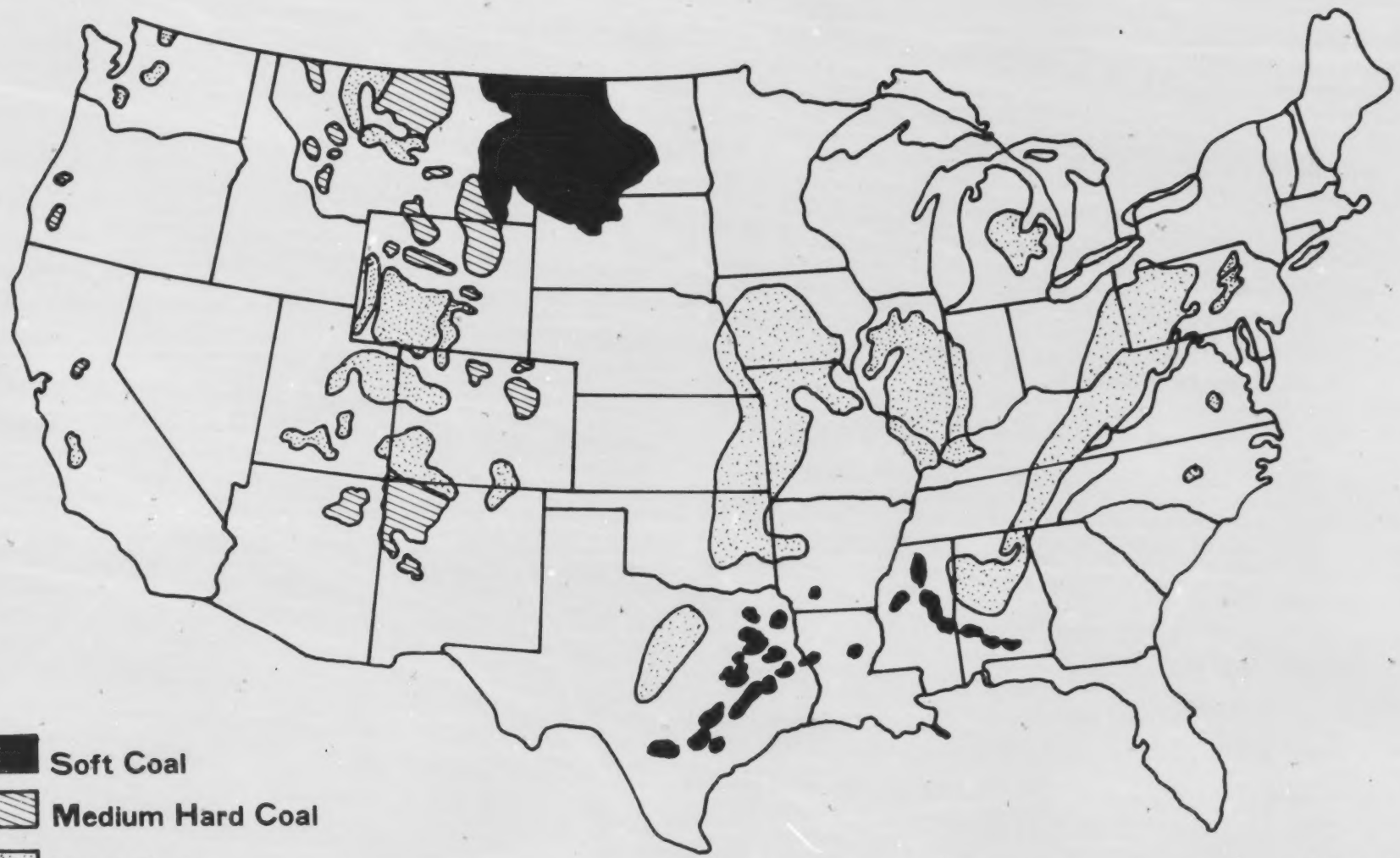
Energy Activities
Grade 5
Packet "B"
Transparency #2
1.1

COAL DEPOSITS IN THE U.S.



nergy Activities
Grade 5
Packet "B"
Transparency #3
1.1

U.S. COAL SUPPLY LOCATIONS



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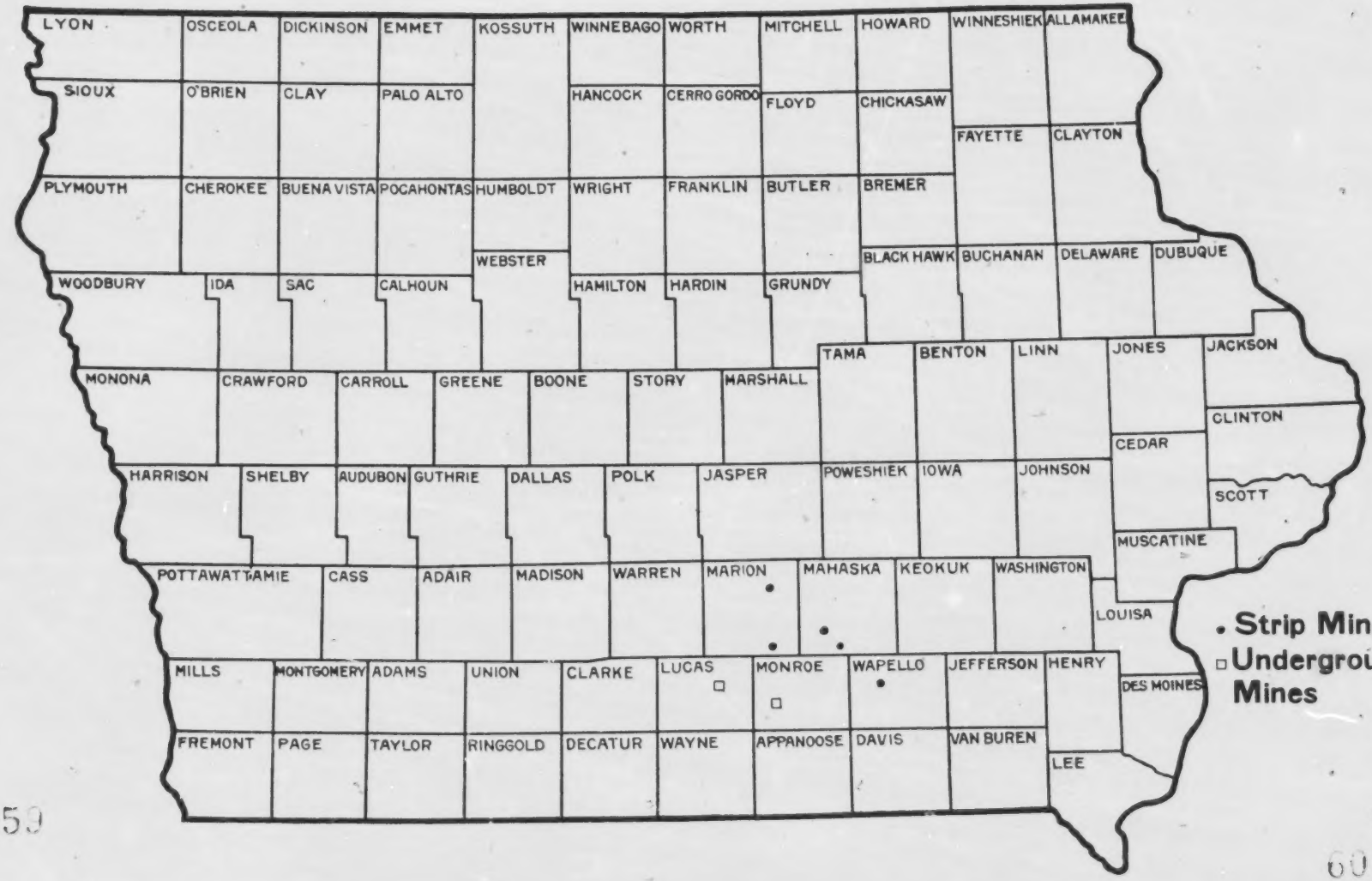
58

5

Energy Activities
Grade 5
Packet "B"
Transparency #4
1.1

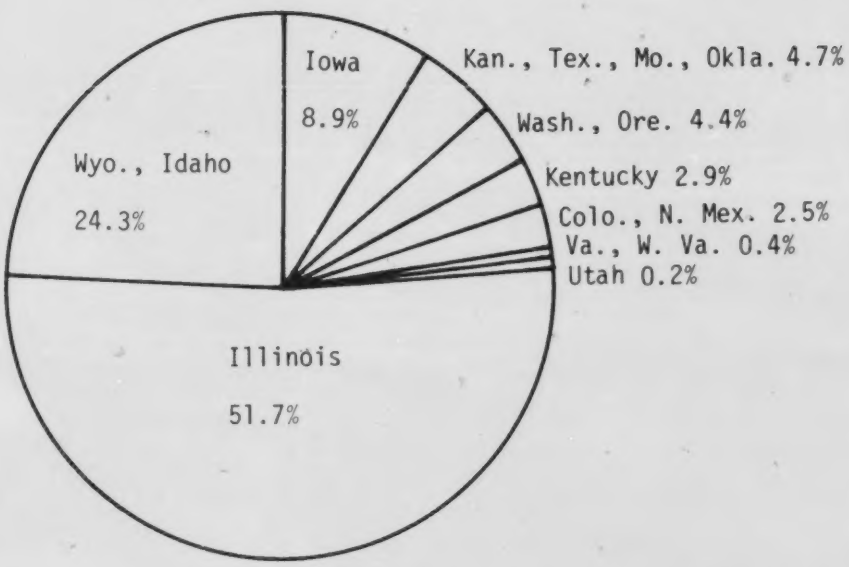
IOWA COAL MINES



Energy Activities
Grade 5
Packet "B"
Transparency #5
1.1

SOURCES OF COAL USED IN IOWA

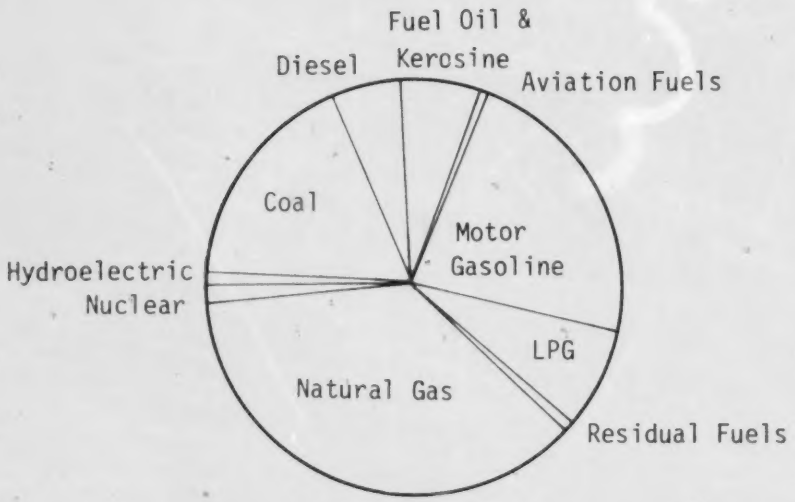
(First half - 1975)

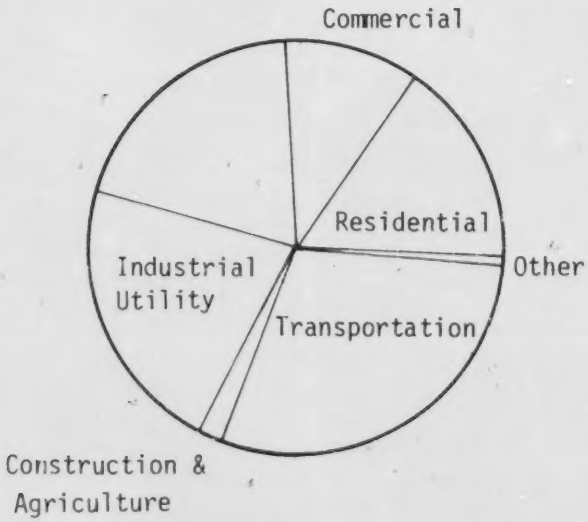


*TOTAL COAL RECEIVED IN IOWA = 3,459,000 NET TONS

Source: U. S. Bureau of Mines, Quarterly Report, "Distribution of Bituminous & Lignite Produced in the U. S."

DISTRIBUTION OF IOWA ENERGY CONSUMPTION



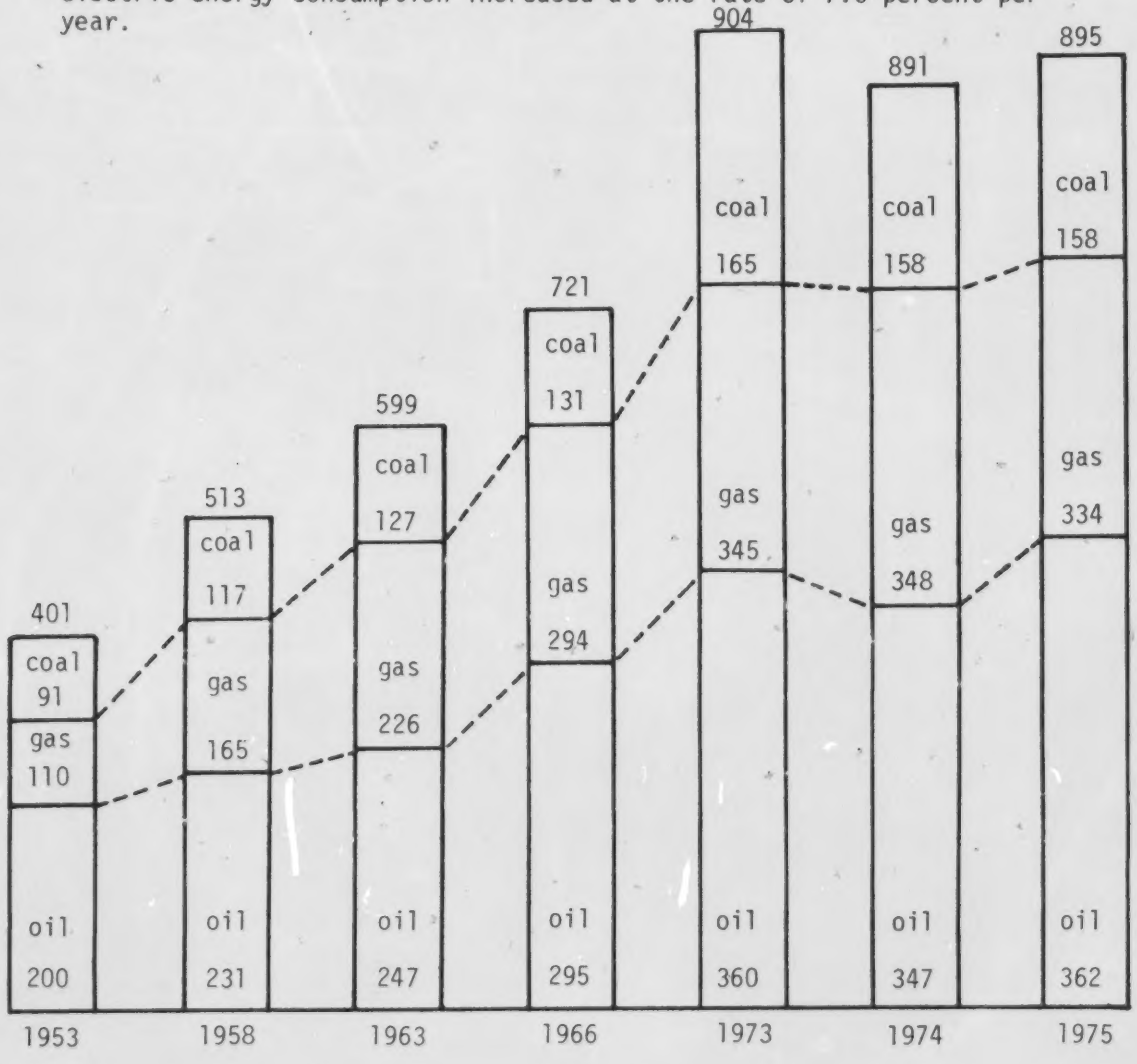


GROWTH OF ENERGY CONSUMPTION IN IOWA

The chart shows the growth for the three major energy sources used in Iowa for the period 1953 to 1975. The growth for this period was:

81% for petroleum
204% for natural gas
74% for coal
123% total

An important component of energy growth is that of electricity, which in Iowa, as in the rest of the U. S., is largely a secondary energy source derived from fossil fuel combustion. Sales of electricity in Iowa rose from 4.675 billion kWh in 1953 to 7.663 billion kWh in 1963 to 15.418 billion kWh in 1973, an increase of 230 percent from 1953 to 1973, or over 6 percent per year. During the same period, U. S. electric energy consumption increased at the rate of 7.0 percent per year.



What kind of energy does my neighbor use?

Name _____

Ask your neighbors which type of energy they use for water heating, cooking, and heating their home. Put a check for each kind of energy they use.

*Remember to be polite! Tell them who you are and what you are doing. Say "Thank you" when you are ready to leave.

Neighbor's Name	Coal	Oil	Natural Gas	Electricity
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				

Energy Activities
Grade 5
Packet "B"
Master #1
2.1, 2.3, 2.4

YOU Can Do Something About It!

*CAUTION: All action should be informed action so reading, learning, interviewing, and discussing are necessary.

Most of us, when we see something wrong, want to try to do something about it. Often, however, we do not do anything because we don't know what action we might take. Below are some things people have done to get desired changes. Which of these actions is your way of doing something? Place a check (✓) by any you have ever done and an asterisk (*) next to any you would consider doing.

Write a Letter

____ 1. Write a letter to the editor of your local newspaper.

____ 2. Write a letter to your Congressmen or your Senators. Compliment them for something they have done about a problem you are concerned about.

____ 3. Send a letter to someone in the news who has done something you respect or admire.

Attend a Meeting or Organize One

____ 1. Write one of the organizations working for a cause you believe in and ask to be put on their mailing list.

____ 2. Ask your own club, church group, etc. to have a meeting or invite a guest speaker on a topic you are concerned with.

Take Part in Some Action

____ 1. Organize a petition drive.

____ 2. Interview people who are in a position to influence others.

____ 3. Wear a button.

Facts to Face Acts

____ 1. Speak up for your point of view.

____ 2. Try to get someone to read a pamphlet or article which argues for a different position than the one he holds.

____ 3. Try to close the gap between what you say and what you do. Let your life be a living argument for what you believe in.

WHO ARE YOU?

Are you someone who...

Y	N	M	1.	will depend upon a car for the majority of your transportation?
Y	N	M	2.	will wear warmer clothes in the winter and keep the thermostat lower?
Y	N	M	3.	will insist on an electric or gas clothes dryer when you have your own home?
Y	N	M	4.	keeps shades drawn on the windows in the summer to keep it cool?
Y	N	M	5.	turns off the lights whenever you leave a room?
Y	N	M	6.	will continue to recycle even though others make fun of you?
Y	N	M	7.	tells others to conserve energy?
Y	N	M	8.	turns the radio on the minute you get into the bedroom?
Y	N	M	9.	will watch a lot of TV at age 40?
Y	N	M	10.	talks a great deal about our energy shortage but keeps using all your appliances?
Y	N	M	11.	believes we will be giving up our "good life" if we cut our use of energy?
Y	N	M	12.	is likely to become increasingly active in energy conservation?
Y	N	M	13.	will be a consistent writer of letters to the editor?
Y	N	M	14.	will run for public office?

ANNOTATED CHILDREN'S BIBLIOGRAPHY
Grade 4-6

BOOKS AND PAMPHLETS

Adler, Irving
Atomic Energy
John Day Company, 1971, 47pp., $3.69

Explains why atomic energy may be the only answer to fuel for power in the future.

Adler, Irving and Ruth
Coal
John Day Company, 1965, 47pp., $3.96

Traces the development of coal, how it is mined, its uses, and its many by-products.

Adler, Irving
Energy
John Day Company, 1970, $3.96

Practical examples of changes from one form of energy to another.

Adler, Irving
Petroleum: Gas, Oil, and Asphalt
John Day Company: New York, 1975, 48pp., $5.95

Aimed more towards the science-oriented. It has concise coverage of the story of oil and gas. It includes definitions, formation, location, and extraction of petroleum.

Barr, Donald
How and Why Wonder Book of Atomic Energy
Grosset & Dunlap: New York, 1961, 48pp., $1.50

Tells the development of the atomic bomb. It also describes the steps taken to learn how to use controlled atomic energy for power.

Benrey, Ronald M.
Nuclear Experiments You Can Do
Thomas A. Edison Foundation, Inc.: Michigan, 1976

Booklet containing some basic facts about nuclear energy and related experiments. Designed to aid in the understanding of nuclear energy.

Energy Reprints from ERDA
Solar Energy

A folder of solar reprints from a variety of sources that provide ideas of what can be done to apply solar energy for use in the home.

Faber, Doris
Enrico Fermi: Atomic Power
Prentice Hall, 1966

Freeman, Mae & Ira
The Story of Electricity
Random House, 1961

Haber, Heinz
The Walt Disney Story of Our Friend the Atom
Simon and Schuster: New York, 1956, 165pp.

Explanation of atomic energy provided in a combination of story and fact.

Halacy, D.S., Jr.
The Energy Trap
Four Winds Press: New York, 1975, $6.95

Describes the energy crisis, its link to the gross national product, and alternatives for current and future fuel resources.

Halacy, Daniel Stephen
Experiments With Solar Energy
W.W. Norton and Company, Inc., 1969, $4.50

Selection of materials, approximate cost, the construction and operation of devices using solar energy.

Harrison, George Russell
The First Book of Energy
Franklin Watts, Inc.: New York, 1965, 77pp.

Words and illustrations explain what energy is, kinds of energy, how energy affects the economy of the world, and what mankind could do with more energy.

Hinkelbein, Albert
Energy and Power
Watts, 1971

Historical approach to energy. Various sources of energy are described. It suggests new ways of using energy and speculates on future supplies.

Iowa Energy Policy Council
Home Energy Conservation

Booklet filled with useful information to help consumers conserve energy.

Iowa Power
"Answers to Forty of the Most Commonly Asked Questions About Electricity"

Small pamphlet available from Iowa Power which states each question and then relates answers which are simply stated and easily understood.

Iowa Power
Be Energy Wise - It All Adds Up!

Booklet designed to help citizens review constructive and up-to-date ideas on how to conserve energy in the home.

Iowa Power
Dr. Wise Use Energy Diet

Booklet available to the public which contains the cost to run every appliance in a home, and some ideas to help consumers cut down energy use.

Irving, Robert
Energy and Power
Alfred A. Knopf: New York, 1958, 140pp.

Describes work, power of different types, sources of energy other than fuels, and energy of the future.

Kelman, Peter and A. Harris Stone
Ernest Rutherford: Architect of the Atom
Prentice Hall, 1969

Kiefer, Irene
Underground Furnaces: The Story of Geothermal Energy
William Morrow and Company, Inc.: New Jersey, $4.95

Easy but accurate explanations of how four kinds of "hot spots" are formed and how they can be transformed into usable energy.

Knight, David C.
Harnessing the Sun: The Story of Solar Energy
William Morrow and Company: New York, 1976, $5.95

Tells of past and present work in the field of solar energy and speculations on what may lie ahead.

Marshall, James
Going, Going, Gone?
Coward, McCann and Geoghegan, Inc.: New York, 1976, $5.49

Consideration is given to the waste of energy resources by Americans. Tells us how and why we allow waste to continue.

Mattison, C.W.
Man and His Resources in Today's World
Creative Educational Society: Mankato, Minnesota, 1967, 150pp., $6.95

Book on man's resources which is well illustrated. It emphasizes conservation and touches on pollution. Also includes future power resources.

Millard, Reed
Natural Resources: Will We Have Enough for Tomorrow's World?
Messner, 1972

Each chapter begins with a question relating to a specific natural resource and the possibility of their depletion. Also provides suggestions for further reading.

Moore, Jordan
Energy
Grosset & Dunlap: New York, 1967, 61pp.

Provides examples of many types or sources of energy and also experiments for a better understanding of what energy is.

National Dairy Council
How Your Body Uses Food
28pp., $.25 per copy

Graphic art, photographs, and text emcompassing easy, safe experiments with foods, challenge for growth, energy and health. The booklet can be useful in science, health, and nutritional studies.

National Wildlife Federation
The Best Present of All
National Wildlife Federation: Washington, D.C.

Comic brochure on energy for children.

Office of Conservation Education
Energy Conservation: Understanding and Activities for Young People
U.S. Government Printing Office: Washington, D.C. 20402
Stock No. 041-018-00091-7, 1975, $.85 per copy

Booklet written in language understandable for the upper elementary and junior high student. The material on energy, its uses, and conservation aids the student in his understanding. The suggested activities are interesting.

Podendorf, Illa
The True Book of Energy
Children's Press: Chicago, 1971

Book relates the importance and kinds of energy to children's own experiences. The book contains short sections and many illustrations.

Pringle, Laurence
Energy: Power for People
Macmillan Publishing Company, Inc.: New York, 1975, $6.95

Author urges young people to face the facts about the energy supplies of the earth.

TCI Advertising, Inc.
The Atom and the Energy Crunch
Reddy Communications, Inc., 1976

Available from Iowa Power. Booklet containing information on the energy crisis; what has caused it, nuclear energy, future energy sources.

TCI Advertising, Inc.
Coal and the Energy Crunch
Reddy Communications, Inc., 1976

Available from Iowa Power. Information on sources of coal, value as an energy source, problems due to use of coal, and the importance of planning ahead.

TCI Advertising, Inc.
Electric Utilities and the Energy Crunch
Reddy Communications, Inc., 1976

Available from Iowa Power. Information to aid in the understanding of where electricity comes from and why the supply of power is threatened.

Reuben, Gabriel H. and Joseph Di Stefano
What Is An Atom?
Benefic Press, 1960

Ross, Frank
The World of Power and Energy
Lothrop, Lee and Shepard, 1967, $4.32

Sun, sky, water, earth, fossil fuels, chemical and atomic energy. The book also concerns itself with energy from the depths of the earth.

Ruchlis, Gyman
Thank You, Mr. Sun
Harvey House Publishers: New York, 1966, 45pp.

Provides many illustrations of how the sun helps mankind and nature.

Shuttlesworth, Dorothy E. and Lee Ann Williams
Disappearing Energy
Doubleday and Company, Inc.: New York, 1974, 96pp., $5.95

Good resource book which presents factual data on the use and misuse of energy. Also reviews what has been done in regards to conservation but does not look into the possible future solutions.

Smith, Norman F.
Sun Power
Coward, McCann and Geoghegan, Inc.: New York, 1976, 46pp., $4.64

Everything that lives and grows on the earth uses energy from the sun. Gives a new understanding and appreciation of the sun, our chief energy source.

Syrocki, Ed.D.
What Is Electricity?
Benefic Press, 1960

Szulc, Tad
The Energy Crisis
Franklin Watts, Inc.: New York, 1974, 128pp., $6.95

Author reveals many disturbing items in relation to the energy crisis and why it is here. It also contains an explanation of why the energy crisis will continue into the future.

Thomas A. Edison Foundation, Inc.
Energy Conservation: Experiments You Can Do
Michigan, 1974, 32pp.

Booklet containing many energy conservation experiments designed to bring about a better understanding of how energy can be conserved at the present time.

Wohlrabe, Raymond A.
Exploring Solar Energy
The World Publishing Company, 1966, 89pp.

Identifies early history of sun worshipers, how the sun provides heat and light which can be turned into electricity. It also discusses the uses of solar energy for the future.

Zim, Herbert
Waves
Morrow, 1967, $3.78

Brief useful introduction of tidal waves and underwater earthquakes.

ANNOTATED TEACHER'S BIBLIOGRAPHY

BOOKS AND PAMPHLETS

Asimov, Isaac
Electricity and Man
U.S. Atomic Energy Commission
U.S. Government Printing Office, 1974

An informative booklet intended to aid citizens in understanding the vital force of nuclear energy. This and other information booklets, are available for the general public. School and public libraries may obtain a complete set without charge. Available from: USAEC - Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830.

Asimov, Isaac
Worlds Within Worlds: The Story of Nuclear Energy, Vol. 1, 2, 3
U.S. Energy Research and Development Administration

Three comprehensive booklets including atoms, electricity, and energy showing how man has learned to produce and control nuclear energy.

Cottrell, Frederick W.
Energy and Society: The Relation Between Energy, Social Change, and Economic Development
McGraw, 1955, 330pp., $15.00

Survey which examines the use of energy in low and high energy societies.

Daniels, Farington
Direct Use of the Sun's Energy
Ballantine Books: New York, 1974, 271pp., $1.95

Provides a review of the potential of solar energy and urges additional research. Fun and informative books which could also spark projects and solar experiments.

Energy Research and Development Administration
Creating Energy Choices for the Future
Office of Public Affairs: Washington, D.C. 20545, 1975

A booklet designed to improve the understanding of the U.S. energy policy.

Federal Energy Administration
Organizing School Energy Contests
Washington, D.C. 20461

Helpful brochure encouraging the formation of school energy contests. Guidelines are given as to the processes involved.

Federal Energy Administration
Tips for Energy Savers
Washington, D.C. 20461

Helpful booklet filled with many useful and simple ways to save energy. Designed for individuals and families, but also contains a teaching guide for teachers to help students bring these tips to the concern of the family.

(Ford Foundation Energy Policy Project)
A Time to Choose: America's Energy Future
Ballinger: Massachusetts, 1974, 511pp., $12.95

Final report of a three-year, $4 million study. Reflects the conviction that America can and should have a national energy policy that serves the needs of all people.

Fowler, John W.
Energy - Environment Source Book
National Science Teachers Association, 1975

Designed for teachers who wish to incorporate a study of energy into their teaching. It is divided into two volumes, each with many charts, tables, figures.

Fritsch, Albert J. and others
Energy and Food: Energy Used in Production, Processing, Delivery, and Marketing of Selected Food Items
Center for Science in the Public Interest, 1975, 80pp.

The authors suggest ways to reduce the input of energy in food processing.

Hammond, Allen L., William D. Metz and Thomas H. Maugh II
Energy and the Future
American Association for the Advancement of Science: Washington, D.C., 1973, 184pp., $3.95

Gives an introduction to each of the present and possible future energy sources. It also covers energy conservation and energy policy.

Halacy, D.S., Jr.
Wind, Sun, and Water: Our Energy Alternatives
Harper, 1977, 192pp., $9.95

Easily read. The renewable resources of geothermal, water, tidal, sea thermal energy, wind, biofuels, and solar energy are presented for consideration.

Hayes, Dennis
Energy: The Case for Conservation
Worldwatch Paper, 1976, 77pp.

Review of the economics of energy expenditures and contains many good charts and graphs.

Hodges, Laurent and John Neff
Solar Energy: 1976
Report from the Iowa Energy Policy Council, June, 1976

Descriptive report of some uses to which solar energy is being put and anticipation for further uses.

Iowa State Department of Public Instruction
Energy Conservation in School Facilities

Brochure designed to encourage energy conservation in school facilities. Specific recommendations for reducing energy waste are proposed.

Lapp, Ralph E.
The Nuclear Controversy
Fact Systems: Connecticut, 1974, 93pp.

Especially interesting to foes of nuclear fission.

Lemish, Dr. John
Mineral Deposits of Iowa
Iowa Southern Utilities Company
Craftsman Press, Inc.: Burlington, April, 1969

Excellent resource for Iowa teachers as it is a statement of the mineral deposits and their potentials in the state of Iowa. Some of the information can be condensed and revised for use with upper elementary students.

Miller, Roger LeRoy
The Economics of Energy: What Went Wrong?
Morrow, 1974, 131pp., $4.95

Short review which includes criticism of living the simple life and price controls.

Olin, Dr. Hubert L.
Coal Mining in Iowa
State Mining Board
State of Iowa: Des Moines, Iowa, 1965

Booklet which presents the early history of coal mining in Iowa, its importance as a resource of the state, and its role in the development of Iowa's economy.

Rocks, Lawrence and Richard P. Runyon
The Energy Crisis
Crown: New York, 1972, 189pp., $2.95

Review of sources of energy, impending crisis, resolutions for the problems the U.S. is presently facing.

Simmons, Henry
The Economics of America's Energy Future
U.S. Energy Research and Development Administration, Office of Public Affairs: Washington, D.C. 20545, 1975

Booklet which reviews the role of energy in American life, trends in energy supply, and highlights various forms of energy.

Steinhart, Carol and John Steinhart
The Fires of Culture: Energy Yesterday and Tomorrow
Duxbury, 1974, 273pp., $4.95

A general introduction to energy. Contains material on energy policy, energy and food.

Stolp, Richard N. and Frederick P. Deluca
Perspectives on Iowa Coal
Energy and Mineral Resources Research Institute, Iowa State University: Ames, Iowa 50011, 1976

Colorful and easily understood report on the Iowa Coal Research Project which provides information for interested Iowans.

Swatek, Paul
The User's Guide to the Protection of the Environment
Friends of the Earth, 1970, 305pp.

Paperback which provides specific information on daily decisions which could improve or deteriorate a person's environment. Packaging products, cleansers, energy consumption in the home, are examples of topics the book covers.

Tuthill, Dr. Samuel and Maurice Van Nostrand
Our Energy Needs: Questions and Answers
1973

Very helpful material regarding an energy shortage in the U.S., related in concise form. Helpful to Iowa teachers at all levels.

Udall, Steward and others
The Energy Balloon
McGraw, 1974, 288pp., $7.95

Author urges development of new attitudes and leaner life-styles in order that there will not be as much wastefulness.

U.S. Department of Commerce
Energy: Critical Choices Ahead
Office of Energy Programs, May, 1975

Brochure designed to put the energy problem into perspective and to give indications of the efforts required to meet energy needs.

U.S. Environmental Protection Agency
Questions and Answers About Nuclear Power Plants
U.S. Environmental Protection Agency: Washington, D.C., Revised, 1973

Pamphlet designed to answer many questions which have arisen concerning nuclear power plants and the environment.

ANNOTATED TEACHER'S BIBLIOGRAPHY

CURRICULUM GUIDES AND RESOURCE BOOKS

American Gas Association, Education Services, 1515 Wilson Boulevard, Arlington, Virginia 22209

Provides many booklets, pamphlets, kits, filmstrip on natural gas. Specifically for grade 5 you may be interested in "Natural Gas Serves Our Community Kit"--N00160 and "Flames and Energy"--N81070.

A Teacher's Introduction to Energy and Energy Conservation
Ohio Department of Education, 1975
Battelle Center for Improved Education, 505 King Avenue, Columbus, Ohio 43201 (ED 127 160)

Guidelines on energy and energy conservation. Provides teacher orientation to energy education and general suggestions for teaching units.

CEL Blocks
Primary Interdisciplinary Environmental Learning Packets,
Brevard County, Florida (ESEA Title III, Project #050-2323-73003)

Student cards covering areas of environmental education which can be used by teachers in a variety of interdisciplinary ways.

Energy
Environmental Education Project, ESEA Title III, Section 306
Topeka Public and Parochial Schools, 1601 Van Buren, Topeka, Kansas 66612 (ED 093 649)

Objectives are listed, along with activities which meet the stated objectives. Teachers select only those appropriate to the objectives for their students.

Energy
Michigan United Conservation Clubs, P.O. Box 30235, Lansing, Michigan 48909

Provides information on the nature of energy, sources and uses of energy, and conservation. There are also some work sheets and ideas for helping others learn more about energy.

Energy
Social Issues Resource Series, Eleanor C. Goldstein, c. 1975.
Social Issues Resource Series, Inc., 1200 Quince Orchard Boulevard, Gaithersburg, Maryland 20760

Notebook filled with reprints of articles related to energy.

The Energy Challenge
Federal Energy Administration
The Energy Challenge, Box 14306, Dayton, Ohio 45414

Twenty-five spirit duplicating activity masters designed for grades 5 through 8. Also contains a teacher's guide section.

Energy Conservation Classroom Kits 1-3, 4-6
Southern California Edison Company, c. 1976
Educational Services, Room 397, P.O. Box 800, Rosemead, California 91770

Colorful kits to help teachers teach about energy conservation. There are folders, inspector cards, stickers, certificates. The teacher's guide contains ideas and lesson plans, in addition to duplicating masters.

The Energy Crisis: What You Can Do About It
Standard Oil Company (Indiana), c. 1973
Mail Code 3705, 200 E. Randolph Drive, Chicago, Illinois 60601

Folder containing four spirit masters and specific teaching instructions. The spirit masters give information and ask for students to supply some interpretation. Parents and other adults are encouraged to participate.

Energy Crisis Teaching Resources
Curry, Wendell, et. al., Oregon State Board of Education, Salem, Oregon, 1973, 59 pp. (ED 085 316)

Many very useful activities to be used in stressing individual responsibility towards energy crisis problems.

Energy - Environment Materials Guide
Kathryn E. Mervine and Rebecca E. Cawley
National Science Teachers Association, Washington, D.C., 1975
(ED 111 663)

Handy source book containing annotated bibliographies for teachers, students, non-print material.

Energy - Environment Mini-Unit Guide
Smith, Stephen M., Editor, c. 1975
National Science Teachers Association, Washington, D.C. (ED 111 664)

Materials designed to stimulate decision making in young children and to make teaching more interdisciplinary. It is filled with many activities and guidelines.

Energy for Today and Tomorrow
San Diego City/County Schools Energy Education Committee
Department of Education, San Diego County, 6401 Linda Vista Road, San Diego, California 92111, 1975

Activities for students in grades kindergarten through six. These help to create an awareness of the need of dealing with energy problems.

Energy and Man's Environment
Jones, John, D.Ed., Editor, 1976
Energy and Man's Environment, Inc., 0224 S.W. Hamilton, Suite 301, Portland, Oregon 97201

Interdisciplinary teacher's guides to energy and environmental activities. Involves 8 books - Activity Guide, Uses of Energy, Sources of Energy, Impacts of Energy, Limits of Energy, Conversion of Energy, Future Sources of Energy, Glossary.

Energy and Man's Environment - Activity Guide
Ris, Thomas F.
Energy and Man's Environment, 2121 Fifth Avenue, Seattle, Washington 98121 (ED 106 070)

Provides educational strategies and materials needed for introducing energy to all grade levels on an interdisciplinary basis. Each chapter has four themes: (1) Scientific, (2) Ethical, (3) Aesthetic, (4) Utilitarian.

Energy Activities for the Classroom - 1976
Coon, Herbert L. and Michele Y. Alexander, 1976
ERIC Center for Science, Mathematics, and Environmental Education
College of Education, The Ohio State University, 1200 Chambers Road, Third Floor, Columbus, Ohio 43212

Resource booklet of energy teaching activities divided into grade levels: K-3, 4-6, 7-9, 10-12.

Environmental Education: Strategies for Wise Use of Energy
Division of Science Education, North Carolina Department of Public Instruction, Raleigh, North Carolina 27611, c. 1974

Designed for use at all grade levels, therefore, activities are grouped K-3, 4-6, 7-12. An appendix contains charts, glossary, bibliography, checklists.

Fun With the Environment
Environmental Protection Agency
Washington, D.C., 1973, 20pp. (ED 103 213)

Activity booklet which helps young children learn about their environment. The booklet has a cartoon and coloring book format.

Heirarchy Chart
John Muir Institute for Environmental Studies, Inc., 2118-C Vine Street, Berkeley, California 94709

Comprehensive total concept chart which was to be used in developing environmental studies curricula to supplement existing K-12 programs.

Living Within Our Means: Energy and Scarcity
Environmental Educational Instructional Activities K-6
The University of the State of New York, The State Education Deparcment, Albany, New York 12234

Instructional manual which illustrates ways in which environmental concerns may be integrated into the curriculum. Excellent activities arranged according to disciplines.

"Mickey Mouse and Goofy Explore Energy"
Walt Disney Productions, 1976
Public Affairs Department, EXXON, U.S.A.
P.O. Box 2180, Houston, Texas 77001

Very comprehensive, yet delightfully presented energy comic book. Copies are available from the above address. Covers previous sources of energy and possible future sources.

My Energy is Your Energy
Arizona Department of Education, February, 1974

Resource book and conservation activities designed for K-12.

Nuclear Power - Meeting a Need a New Way
Cedar Rapids Community Schools, 346 2nd Avenue, S.W., Cedar Rapids, Iowa 52404, c. 1972

Provides good suggestions as to teaching about nuclear power.

Student Learning Activity Module "The Energy Crisis"
Hughes, Judi and Lee County Environmental Education Program
Title III ESEA, 2266 Second Street, Fort Myers, Florida

Contains lesson plans, resource materials, and a Student Teaching Module on energy. Developed to help create an awareness of the causes, and some solutions for the energy crisis the world is facing.

Teacher's Handbook of Energy
Colorado Department of Education, Denver, Colorado 80023, c. 1974
(ED 119 957)

Provides teachers with information on energy and instructional activity suggestions.

Ways to Environmental Education, Volume III
Allen, Rodney F., Ed. and Others
Florida State University, Tallahassee College of Education, Tallahassee Junior Museum, Florida, 1975, 150pp.

Ten environmental booklets in one volume. One booklet covers energy learning activities for camp and home.

Wide World of Energy Kit
Walt Disney Productions, 1976
Walt Disney Educational Media Company, 500 South Buena Vista Street, Burbank, California 91521

Kit contains cassette and color filmstrip titled, "The Search for Power and Energy;" 18 full-color study prints; Energy Game; 30 copies of the energy comic book, "Mickey Mouse and Goofy Explore Energy;" 10 energy activity cards; teacher's guide with information and additional activities.

ANNOTATED TEACHER'S BIBLIOGRAPHY

EDUCATIONAL JOURNAL ARTICLES

Asimov, Isaac
"The Fascinating Story of Fossil Fuel"
National Wildlife
Vol. 11, November 5, August-September, 1973

Colorful charts could be helpful material for teachers.

"Energy Consumers Turn into Conservationists"
Nation's Schools
93: 4: 26-28, April, 1974

Describes how the topic of energy conservation has been introduced into school curriculums. Salem, Oregon; Marshalltown, Iowa; Des Moines, Iowa; Buckingham, Pennsylvania are mentioned specifically.

Fowler, John M.
"Does the Energy Theme Belong in the Classroom?"
Today's Education
65: 88-9, March, 1976

Teachers are encouraged to put more emphasis on energy education in the schools. Suggestions are given to make it interdisciplinary and goals are stated which aim to prepare the "students of today - citizens of tomorrow" for life.

Fowler, John M.
"Energy, Education, and the 'Wolf' Criers"
Social Education
pp. 245-256, April, 1976

Examines the background to the current energy crisis and outlines some possible solutions to the problems.

Glickman, L. J.
"Teaching Guide on Energy"
American Education
11: 40, June, 1975

Reviews an informative handbook entitled Energy Crisis Teaching Resources: A Special Publication Suggesting School Activities Which Stress Individual Responsibility Towards Energy Crisis Problems which was initially written for Oregon's Energy Crisis Week (December, 1973).

Hankla, Alice Kimbler
"An Energy Conference for Little People"
Science and Children
Vol. 12, No. 7, pp. 5-7, April, 1975

Reviews a conference which was held for children ages 4 and 5 at which they learned what energy is, how it works, and devised methods of energy conservation.

Harder, Peter J.
"Activity Cards Bridge Science and Social Studies"
Science and Children
Vol. 12, No. 7, pp. 8-10, April, 1975

Utilizing photography, the author developed a series of local photos to be made into activity cards with the questions on the back. Several different approaches to using the cards were suggested.

Hawkins, M. E.
"Energy: Future Alternatives and Risks"
Science Teacher
41: 25-7, April, 1974

Review of a two-day Academy Forum on Energy sponsored by the National Academy of Sciences. The Forum took up six propositions regarding energy. Many ideas were brought before the assembly.

Johnson, W. A.
"Energy Cricis: Not Only Why But What Can We Do?"
NASSP Bulletin
58: 28-36, May, 1974

Author expresses that the reason the U.S. is a nation of energy spendthrifts is that we have been paying far too little for the energy we use. Feels that a rise in prices will provide the incentive for conservation.

Kenick, L. E.
"Energy Teaching Centers"
Science Teacher
43: 34-5, May, 1976

Author proposes setting up Energy Teaching Centers within a community for school children, parents and homeowners, and teachers. These centers would provide means for the local population to explore and encounter energy alternatives.

Kirman, J. M. and M. A. Nay
"Joint Planning for Integrating Social Studies and Science: Teaching About the Energy Crisis"
Social Education
39: 77-80, February, 1975

The authors express the hope that by encouraging the integration of social studies and science, schools will begin the process of providing an integrated curriculum.

Messer, Melanie B.
"Energy for Today and Tomorrow with Energy Eagle"
Science and Children
Vol. 14, No. 3, pp. 18-20, November/December, 1976

Delightful energy awareness activities produced by the San Diego County Department of Education for use with elementary students. Teachers are encouraged to adapt these to their own local situations.

Nesbitt, William A.
"The Energy Question: Problems and Alternatives"
Intercom
pp. 12-16, September, 1973

Proposes some ideas for teaching about the energy questions, charts, background information and data, and some suggested solutions with both the advantages and disadvantages.

Post, T. R.
"Energy Crisis: An Opportunity for Meaningful Arithmetical Excursions"
Arithmetic Teacher
22: 61-4, January, 1975

Suggests math activities which provide meaningful situations. Emphasis is to help students become sensitive to the implications a national crisis could bring.

Sartwell, J. G. and R. P. Abell
"Teacher's Guide to the Energy Crisis"
Today's Education
64: 90-7, January, 1975

Authors present facts about energy use, questions for students and teachers, alternative sources of energy, ideas for classroom use, and resources which are available.

Sommerkamp, P.
"Energy Crisis Gameboard"
Science Teacher
42: 39-40, June, 1975

Describes a game devised by students in Kentucky as a result of their study of energy. There are two versions - one without cards and one with cards.

"Starting Points - Energy: Plugging into the Fuel Crisis"
Learning
Vol. 2, No. 4, December, 1973

Aimed at teachers of K-8. Contains a series of activities to help students understand what energy is, as it flows through our life.

Yant, S. L.
"Facing the Energy Crisis in a Mathematics Classroom"
Arithmetic Teacher
23: 223-4, March, 1976

Teacher relates specifics of an eight-day project within a math class that created practical applications to the energy crisis.

MULTI-MEDIA MATERIALS

"The American Dream is Running Out of Fuel"
18 minutes, color, $230 or $19-rent (Gr. 5-8)
Films, Inc.
1144 Wilmette Avenue
Wilmette, Illinois 60091

"Bate's Car: Sweet as a Nut"
16 minutes, 16mm, color, $230 or $30-rent, 1975 (Gr. 5-12)
Arthur Mokin Productions
17 W. 60th Street
New York, New York 10023

Presents the inventor's energy-saving inventions, particularly his methane-driven automobile. Highly recommended by AAAS.

"Coalmining: The Story of Buried Sunlight"

Filmstrip, elementary

Ecology Activity Cards
BFA Educational Media
2211 Michigan Avenue
Santa Monica, California 90404

Some of the activities related specifically to energy. Others in the box guide the children towards conservation and the idea of using our resources wisely.

Ecology: Understanding the Crisis
Series No. 6454, c. 1972
Encyclopaedia Britannica Educational Corporation
425 North Michigan Avenue
Chicago, Illinois 60611

Filmstrip, records, guides. General coverage of what has caused the crisis, how man relates to his environment, a look into the future.

"The Economics of the Energy Problem"
Economic Topic Series
Teaching Resource Films, 1976

Sound filmstrip. Provides a basic overview of the energy problem.

"Electricity"
Community Series: Systems in Our City

Elementary level filmstrip.

"Electricity from Heat and Sunlight"
8mm film loop, color, with teacher's guide, $23.50 (Gr. 4-12)
Doubleday Multimedia

Shows how electricity can be produced from heat and sunlight.

"Energy"
Iowa Petroleum Committee

"Energy: A First Film"
8 minutes, sound, color (Gr. K-3)
BFA Educational Media
2211 Michigan Avenue
Santa Monica, California 90404

"Energy: Ability to Do Work"
9 minutes, color, sound (Gr. 5-8)
AIMS Instructional Media Service
P.O. Box 1010
Hollywood, California 90028

"Energy and Power - A First Look"
10 minutes, 16mm, 1962 (Primary - Intermediate)
Journal Films

Outlines, from the days of the caveman to the present, many ways in which man harnesses energy and increases his capacity to do work by utilizing the potential energy found in wood, wind, and running water.

"The Energy Challenge" - Kit, c. 1975
Pollution Control Education Center
Township of Union Public Schools
Union, New Jersey

Grade level undesignated, however, could be used in Gr. 6 with some modification and for the junior high. Contains student booklets, teacher's guide, two filmstrips with cassette, duplicating masters, activity cards, and overhead transparencies.

"Energy Crisis"
13 minutes, 16mm, color, 1972 (Gr. 4-9)
Journal Films

Reviews the different energy sources and indicates the length of time we may be able to depend on them. Shows the possibility of solutions and developments which may some day provide unlimited power to meet our needs.

"Energy Crisis Game," 1973 (Upper elementary and junior high)
Intemation, Inc.
New York, New York 10001

For 2-6 players.

"Energy Game"
Northern Natural Gas"

Twenty minute slide and sound show followed by a quiz, designed for grades 4-6. The stress is upon energy conservation with a short review of where energy comes from.

"Energy With a Capital C - for Conservation"
Energy Policy Council
707 East Locust
Des Moines, Iowa 50319

Slide presentation complete with slides, audience pamphlets, and a recorded cassette of the slide narrative.

"First Film on the Wind"
9 minutes, 16mm, color, sound, c. 1966 (Elementary)
BFA Educational Media
2211 Michigan Avenue
Santa Monica, California 90404

Shows how, though one cannot see the wind, he can see what the wind does, such as making waves on the water, swaying trees, and lifting kites. Shows how rain clouds come and go with the wind.

"Global Emergency: Energy"
Guidance Associates, c. 1975 (Gr. 6)

Two sound filmstrips, "New Sources, New Values" and "The Energy-Aware Society," which deal with the various alternative sources of energy. It also looks at the social, economic, and political problems in our world of shortages. The students also look at alternative life-styles.

"The Great Search: Man's Need for Power and Energy"
13 minutes, 16mm, color, with teacher's guide, 1972 (Gr. 4-up)
Walt Disney Production

Traces history of man's attempts to harness energy of sun, water, lightning, etc. in order to produce power needed for daily living.

"Man's Search for Energy"
Filmstrip, 36 frames, $6.75 (Gr. 5-8)
McGraw-Hill Films
1220 Avenue of the Americas
New York, New York 10020

"Our Energy-Based Economy"
EEI Pub. No. 74-54
Edison Electric Institute

A multi-media instructional program for Gr. 6-8. Contains four filmstrips, four records, duplicating activity sheets, duplicating pre/post assessment sheets, and a teacher's guide.

"Our Energy Supply"
Part of The Only World We Have Series (Gr. 6)
Narrated by Dr. Leonard Reiffel and Miss Moones, Bell and Howell

Twenty minutes, two-part tape. Presents a wide variety of the problems relating to our energy usage. Covers definition of energy, present sources, explains origin of our energy problem, possible energy sources.

"The Petrified River"

Film available from Iowa Electric Light Company.

"Power"
Color filmstrip, 53 frames. Sound with cassette or record. (Intermediate - Junior High)
From Water and How We Use It Series, 1971
6 filmstrips with cassettes, $70.00; with records, $55.00
Coronet Instructional Films

Shows how water power helped the development of early industry and how water supplies power for hydroelectric energy from the water and how we use it.

"Power and Energy"
Set of two filmstrips, record or cassette, automatic and manual, $25.00 per set
18-20 minutes, color, 50-59 frames, with teacher's guide (Gr. 5-9)
Educational Activities

Answers such questions as: Where does energy come from? How is it produced and distributed? Why are there "Brown-outs?" How do you produce power from fossil fuels, fission, fuel cells, ocean, solar energy?

"A Practical Guide to the Energy Crisis," 1975
Schloat Productions Distribution Center
West Nyack, New York 10994

Two excellent color filmstrips, two records or cassettes. Part One: "Reasons for the Crisis," 89 frames, 10 minutes. Part Two: "Responding to the Crisis," 78 frames, 11 minutes. (Gr. 6-8)

"Science and Society: An Inquiry Into Technology and Values: Energy," 1975
Schloat Productions Distribution Center
West Nyack, New York 10994

Excellent sound filmstrip program containing two filmstrips with cassettes. Filmstrip I - "Power Struggle," 101 ft., 19 minutes. Filmstrip II - "Future Power," 103 ft., 19 minutes. (Gr. 6-8)

"This Earth: Everything Fits Together," 1973
Guidance Associates

Multi-media learning experience for the elementary years. Children see that everything is interdependent and that the sun is the energy source for all life on earth. Sound filmstrips, study cards, poster, game poster, stencils, work sheets, and teacher's guide.

"The World of Energy"
Filmstrip (Gr. 5-8)
National Geographic Society
Department 1037
Washington, D.C. 20036

TEACHER'S RESOURCE LIST

In addition to those listed below, specific suggestions are also included within the packets with the activities.

1. AEA - Area Education Agency

   Check their film and book catalogs and any other material they have available.

2. Chamber of Commerce

   Contact for help in locating local solar buildings and homes, industries which may be cooperative, etc.

3. C.U.R.E. (Citizens United for Responsible Energy)
   1342 30th Street
   Des Moines, Iowa 50311 (515/277-0253)

   Contact for information and speakers.

4. Iowa Energy Policy Council
   707 East Locust
   Des Moines, Iowa 50309 (515/281-4420)

   Contact for information and speakers.

5. School custodian.

6. Utility and Power Companies.

WILL YOU HELP US?

Use the following space for suggestions, criticisms, or comments. We welcome any contribution you may wish to make. Please send these to Duane Toomsen, Environmental Education Consultant, Curriculum Division, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

Name _____

Address _____

City _____ State _____ Zip _____

School _____ Grade _____

How did you use the Packet?

Was it relatively easy to integrate the activities into existing studies?

What were your feelings about the values activities?

How could the packets be improved?